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SCIENTIFIC AMERICAN

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The great hydro-electric plant at Rjukan, Norway, of 250,000 maximum horse-power, is made up of 15,000 horse-power units, each consisting of two Pelton wheels and twin generators mounted on a common shaft.

A 7,500 HORSE-POWER PELTON WATERWHEEL. [See page 278.]

SCIENTIFIC AMERICAN

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The Editor is always glad to receive for examination illustrated articles on subjects of timely interest. If the photographs are *sharp*, the articles *short*, and the facts *authentic*, the contributions will receive special attention. Accepted articles will be paid for at regular space rates.

The purpose of this journal is to record accurately, simply, and interestingly, the world's progress in scientific knowledge and industrial achievement.

Good Crops and Good Times

AMONG the many prophets who have lately been predicting a return of business prosperity there is one whose voice speaks with special authority. We refer to the Agricultural Department at Washington, whose recent announcement that the crops throughout the United States promise to be of unusual abundance will do more to stimulate confidence in the business world than any official announcement that has emanated from Washington for many months past. Not that the Agricultural Department has made any definite prediction of a revival of business, for that does not come within its province; but it is so generally understood nowadays that thriving agriculture is the basis of general business prosperity, that the announcement of a "bumper" crop has come to be taken as equivalent to a prediction of a prosperous year.

The estimate of the probable crop for this year presents an imposing and encouraging array of figures. The wheat crop, which is estimated at over 700,000,000 bushels, should bring to the farmer over $600,000,000. The corn crop, which is estimated at nearly 3,000,000,000 bushels, has a farm value estimated at $1,350,000,000; while the value of the oats crop, which will reach the highest figure in the history of our country, or 1,290,000,000 bushels, is not far short of $400,000,000. Adding to this the value of the crop of rye and barley and the other multitudinous farm products, it is estimated that the value of the products of our farms at present prices will be over $7,000,000,000. Not only does this vast sum benefit the farmer by swelling his bank account or by enabling him to lift his burden of mortgage, but the moving and disposal of the crop will bring proportionate wealth in other directions; to the railroads for transportation, and to the steamship companies for carrying the surplus abroad; to the owners of the elevators, a vast industry in itself; to the owners of the huge mills that turn it into flour, and to the buyers and brokers who bring producer and consumer together.

Nor does the stimulus of plentiful crops end with the mere matter of their sale and distribution. The farmer himself becomes a large purchaser of agricultural machinery, and the general improvement of his farm by the construction of new buildings, the construction or renewal of fences, to say nothing of the purchase of automobiles and additional luxuries for his home, not only directly stimulates business in a wide variety of trades, but, indirectly, reacts strongly in stimulating that revival of credit and confidence which is essential to any lasting prosperity.

Theory Modified by Practice

AS the result of his experiments with the whirling table, Langley demonstrated that the forward portion of the wings of an aeroplane is more efficient than the after portion, and he showed that, other things being equal, the greater the length of the leading or entering edge in proportion to the area of a plane, the greater would be the efficiency. In other words, a long and narrow plane would be more efficient than one that was short and deep. Basing their conclusions upon this theory, many writers predicted that, as speed increased, the planes would approach in their proportions the long and narrow wings of fast-flying birds such as the albatross.

As a matter of fact, the progress of the last few years in racing machines has shown a tendency to shorten the length and deepen the width of the plane, a tendency which was particularly noticeable in the remarkable machine with which Vedrines won the cup at Chicago. The reason for this departure from theory is that for structural reasons the shorter and deeper wing is found to be preferable. For a given area and weight, the more compact the machine, the stronger it will be. Bending stresses, tending to break the wings are less, and the head resistance also is reduced—the guy wires being shorter and the whole system of trussing presenting less area and head resistance. Langley's law still stands; and the proportions of the racing monoplane of to-day simply prove once more that theory is ever greatly modified by practice.

Again the Question of Pier Extension

LAST year it was the White Star Line and this year it is the Hamburg-American Line that is petitioning the War Department for a permit to add one hundred feet to its piers at the port of New York, in order to accommodate its latest and largest passenger ship. The "Imperator," which was supposed to be 900 feet, and we are now informed by the Vice Director of the company is 919 feet in length over all, is due at this port next spring. The longest pier of the Hoboken docks of this company is 850 feet in length or seventy to eighty feet less than is necessary to give accommodation, with proper clearances, for the new liner. When the White Star Line had its hearing before the War Department it was urged in reply that the granting of the permit for a 100-foot addition would not by any means settle the question of encroachment upon the North River fairway; since even larger ships would probably be built in the future. The predicted increase has occurred, and once more the Board of Engineers of the United States Army are confronted with the problem of reconciling the apparently conflicting interests of the owners of these big ships and of the owners of the lesser craft which make use of the Hudson River.

The Board of Engineers, whose duty it is to protect the rivers and harbors of the United States against encroachment by private interests, have always shown a commendable zeal in the fulfillment of this trust. To say that at times they have erred on the side of caution and have been perhaps a little too reactionary, is distinctly to their credit; for the State and Federal interest in the preservation of our rivers and harbors is both large and permanent; and over and above that are those vast commercial interests, whose urgent demand that the harbors and waterways of the country be so safeguarded as to promote the greatest good of the greatest number cannot be gainsaid.

Now with regard to the particular case of the Hudson River, it will be agreed that if the proposed extension of piers into the fairway will impair its usefulness as a great artery for waterborne commerce, the lengthening of these piers, however greatly it may be demanded by the exigencies of any particular steamship company, should be strictly forbidden.

But will a moderate extension of the piers work any serious injury to the Hudson River? We very much doubt it. As a matter of fact, after over a year of service, the 100-foot extension of the White Star Line pier has failed to show that it has been detrimental to the river, either by causing swifter currents, or by acting as an obstruction to traffic up and down the Manhattan shore line. For this reason, among others, we believe that the extension of the Hoboken piers should be permitted, and this, not merely in the interest of the particular company now affected, but of shipping at large, and of the port of New York in particular.

In any discussion of this question there is one fact which must never be forgotten, namely, that there will be an inevitable growth in the size of future steamships. This increase is guaranteed by the fact that, other things being equal, it costs less to carry a ton of freight a given distance in the larger than it does in the smaller ships. Passengers, moreover, can be transported with greater comfort and with less distress from the motion of the sea. Ships will grow larger, not smaller; let us be sure of that; and if, because of the lack of accommodation, the large ships of the future cannot come to the port of New York, they will go to those harbors where they can be accommodated.

The question, then, narrows itself down to this: Are we willing to sacrifice a little of the width of the Hudson River at New York in order to maintain our position as the leading port of the Atlantic seaboard? The argument in favor of pier extension is strengthened by the fact that in comparison with the large ports of the world, New York, in respect of the width of its fairway, is the most favorably situated of all. Thus the clear width of the Thames at the London docks is 600 feet only; Hamburg and Rotterdam have about 1,200 feet; the Thames at Tilbury docks has only 1,600 feet; Antwerp, 2,000 feet; and the great docks of Liverpool have only from 2,000 to 2,400 feet between opposite pierhead lines. As compared with this, the Hudson River at its narrowest point has a clear width of 2,650 feet; and even if the requested 100 feet be added to the Hoboken pier, there will still be a clear width of 2,840 feet between the bulkhead lines.

The SCIENTIFIC AMERICAN would be the last to advocate such an encroachment upon the river as would be detrimental to traffic; but in view of the facts relating to other great ports of the world, we believe the proper compromise between length of piers and width region of river has yet to be reached. Probably the limit of pier length will be found to lie between 950 and 1,050 feet, according to the location.

Pipe Galleries

IT is a strange anomaly that in this scientific age, and particularly in practical America, the continual tearing up of streets to lay, repair, and connect up pipes and wires, has not been superseded by the practice of putting underground structures in pipe galleries. The inconvenience of the constant street disturbance is apparent to every one, and the wastefulness of present methods has been forcibly pointed out again and again. Nevertheless, nothing substantial has been accomplished in America in the way of building municipal pipe galleries.

It is true that the frequency of street opening may have been reduced, and that public service corporations are not allowed to dig whenever they please, without the formality of even a permit. Moreover, before new pavements are now laid down, in many cities it is more often the custom to require corporations to do in advance any substantial construction or repairs which may be needed, in order to postpone as long as possible the first breaking up of the new pavement. And yet, sooner or later, the breaking up process begins again.

The most extensive placing of underground structures in galleries is, of course, to be found in Paris and London, the sewers being used in Paris, while in London the County Council has constructed pipe galleries under a number of new streets. The trouble in America has not been due to a lack of study of the subject; for the best-designed galleries actually planned anywhere appear to have been those proposed by the late Rapid Transit Commission for the subway in lower Broadway, New York. These galleries, it may be remembered, had seven separate divisions, with the electric ducts of the street railway company in the center, chambers for pipes on each side of the street, and separate ducts for high and low tension conductors, also on each side, with separate manholes for each class of wires, and distribution passages from manholes along in front of buildings. Long openings for handling pipes and ventilation were also provided, and it was a great setback to the progress of street engineering when the idea of building the galleries had to be abandoned. Various types of galleries, based on the New York type, were suggested for Boston, when the Washington Street subway was proposed, but nothing resulted beyond the plans.

The chief reason for the failure to build the lower Broadway galleries was said at the time to be a difference of opinion as to what city department was to have charge of the galleries, and unfortunately the completion of the subway could not be delayed for the settling of the question. In Boston there were several objectors. The municipal engineers consulted wanted their pipes above the subway, while the railway company objected to any construction which would lower the station platforms a foot more than was absolutely necessary. The city engineer, moreover, objected to any placing of pipes, water, sewer, or gas, in an open gallery, no matter how well designed, on the ground that the character of municipal employees had so deteriorated that it was unsafe to place the maintenance in their hands of pipes in a common gallery.

While it is well to err on the side of safety before making radical changes, there appears to be ample testimony that the placing of pipes in galleries would make for greater safety instead of greater danger. In the London galleries, large gas mains are found close to electric light cables, and yet no explosions have occurred; whereas gas mains buried under streets have caused constant explosions in different cities.

The first American city which will make a real beginning with pipe galleries, will be performing a great public service. A block or two would be better than nothing; but what is done should be well done or not at all. For a badly constructed or poorly maintained gallery might hurt the cause more than it helped. It is greatly to be hoped that the public service corporations will see the advantages of going into well-regulated municipal galleries, instead of burying their pipes and wires in the present haphazard fashion.

Electricity

Street Lighting with Quartz Lamps.—To show by contrast how poorly Chicago is lighted, a group of business men has installed six quartz-tube mercury-vapor lamps on a block of Randolph Street, 320 feet long. The lamps are of 5,000 candle-power and burn seven hours per night at an annual cost of sixty-nine cents per curb foot.

A Diesel Electric Car.—On the Enkoping-Hoby line of the Swedish State railroad there is now running a new combined Diesel engine and electric car which carries 40 passengers. It is claimed that the Diesel engine which burns crude oil, is very well adapted for this purpose and is superior to the benzol motor. This latter was tried by the company but rejected. The railroad line is a short section of 25 miles, and a good speed of 45 miles an hour is obtained. As usual, the engine drives a dynamo so as to give current for the car motors. The fuel consumption is 22 pounds of oil against 0.5 to 1 ton of coal for a steam locomotive, and a small amount of water is used. As little water is consumed, but few stops need be made to take on water.

Surveying With the Aid of Wireless Telegraphy.—The Belgian government is engaged upon plans for the use of wireless telegraphy in mapping colonial regions, especially Belgian Congo. It is well known that a very exact result can thus be obtained for the difference in longitude between any two points as shown by the difference in their respective times. Previous experiments prove that this latter is readily shown by sending wireless signals between the two points. The method is likely to prove a valuable one in colonial regions where there are no telegraph lines, as portable wireless posts can be set up with little trouble. In Belgium it is thought that a map of the Congo which would take ten years to draw up can now be made in two years.

Wireless Telegraph Outfit for Aeroplanes.—The new Flanders army aeroplane is commencing to make flights in order to test the new wireless outfit that has been fitted upon it, and some good results are expected. The apparatus is of the latest Marconi construction and is made up into separately contained units so as to permit of distributing its weight, as may be found necessary. A special unspillable accumulator is employed. The only high-tension wire on the aeroplane is run in a well-insulated tube through the fuselage of the machine, so as to guard against shocks. The trail wire has a safety-breaking plug which releases the wire at once when pulled upon by any object on the ground. For the ground-receiving station an improved portable wireless post is used which can be erected in a few minutes.

Heating a Church With Electricity.—A successful instance of electric heating for a large church is seen in the St. Sebaldus Church at Nuremberg. Individual heaters are used in each pew so that a good distribution of heat results. This is done by mounting a long tube heater near the floor in front of the seat and along the back of the following pew, which acts as a foot warmer. The electric heating tube is a 3-inch iron pipe which contains a smaller tube wound with resistance wire. At each pew is a switch for cutting out the heater, and all the separate wires from the heaters run to connection boxes placed at different points under the floor. A perforated iron foot rest runs along above each heater. The church has a seating capacity of 1,200, and the length of pews is 1,750 feet in all.

Electric Cars for the Suburban System of Paris.—Preparatory to carrying out the project for using electric trains on the extensive west suburban system of Paris, the railroad company is testing a new passenger motor car which will probably be used. It is now running on the Paris-Versailles electric line. For the suburbs it is desired to adopt a system of frequent and short trains as in the subway, and these will be made up of trains of two or several motor cars and perhaps trailers. The new car has double trucks, each one fitted with a 250 horse-power motor, making 500 horse-power for the entire car. It makes 50 miles an hour on the level. Trains are made up with a motor car at each end and intermediate motor cars or trailers, using the multiple-unit control method. Such cars have seats for 100 passengers. At some hours a single car can be run, and at others 6 to 8 cars.

Wireless Telegraphy in Bolivia.—Bolivia is the latest of the South American republics to adopt wireless telegraphy, the government having entered into a contract with the British Marconi Company for laying out an extensive scheme. This provides for the erection of two groups of stations, namely, five stations of 5 kilowatt size and two 10-kilowatt plants. The latter will be erected at La Paz and Puerto Saurez, while the smaller plants are located at Riberalta, Cobija, Trinidad, Yacuiba and Santa Cruz. The progress of this work will be watched with interest, for the stations may ultimately become linked in a considerably larger network than is at present apparent. Bolivia, Chile and Argentina—at least three countries—will be in possession of important wireless organizations, so as to perfect the internal working and connect the three republics.

Aeronautics

The following unique advertisement appeared recently in a Hanover (Germany) paper: "Lost, from an aeroplane, gold watch and chain; was last seen disappearing in large stack of rye on a field near Ulzen. Liberal reward for return of same."

A Proposed Long-distance, Hydro-aeroplane Flight.—A Paris to the sea flight for hydro-aeroplanes is being discussed by the Aero Club for next year, and the prevailing idea is to make it a river and sea event, that is the flights will take place over the Seine from the city to the Channel coast at Deanville, the well-known watering place. Then the flyers will make over-sea races of various kinds in the Channel region. At Deanville it is greatly desired to promote an event of the kind, and a local committe is now formed, headed by Prince Murat and Senator Henri Deutsch.

An Aeroplane for Vertical Movement.—In a patent, No. 1,037,278, a St. Louis man, John R. Martin, presents an aeroplane in which a segmental rack is carried by the plane and a gear carried by the car suspended from the plane is meshed with the rack and the plane may be shifted from a vertical to a flying position. A propeller is carried by the plane and is suitably driven and means are provided for operating the steering device so that a single propeller may be employed to lift the entire machine from the ground in a vertical course to a flying position and may then propel the machine in flight.

Flying Boats on Lake Leman.—During the present season's tests a number of hydro-aeroplane flights are being made on Lake Leman. Recently the Swiss pilot, Grandjean, on a monoplane of his own design with a 50 horse-power Oerlikon motor, won the Eynard prize of $2,000 which was founded in 1909 under rules made by the Swiss Aviation Club. Grandjean made the flight over the lake from Chillon to Versoix, near Geneva, with stops according to the rules at Ouchy and two other places. He thus holds the prize, but this can be competed for up to December 21st of this year.

Hunting with Aeroplanes.—Hunting of game by aeroplane is likely to become one of the sports of the future, and in France several of the pilots are becoming adepts at this kind of chase. Moreau is one of these, but he lately met with an accident which however is not very serious. He had been invited by the Mayor of Varennes, near Paris, to take part in the opening of the fall hunting season, and was flying near the ground, when a shot fired by an imprudent hunter struck him in the eye. But he was soon able to make a landing and received medical aid at once, so that probably he will not be laid up for more than two weeks.

Long Distance Conduit Pipe for Hydrogen.—The newly opened airship harbor at Frankfort, Germany, has a long distance main for hydrogen, the first of its kind in Germany. The gas comes from the chemical factory "Elektron," of Griesheim, 2⅛ miles away, where daily from 635,000 to 706,000 cubic feet of hydrogen are obtained as a by-product, which formerly was allowed to escape into the air. This quantity would be sufficient to fill completely one Zeppelin airship a day. At present the amount of gas that can be piped to the terminal at Frankfort is 35,000 cubic feet per day. On account of the easy diffusibility of hydrogen gas, nearly the entire length of the piping had to be welded together by the autogenous process. The gas is conveyed to a gas holder of about 212,000 cubic feet capacity, from where it is led through subterranean pipes to the cement flooring of the airship hall. These pipes terminate in 18 shafts from which connection can be made with the individual gas cells of the airship.

A Military Farman Biplane.—A very interesting test was made by Henry Farman with a new aeroplane, which is designed for army use, this being a miniature biplane having a total spread of 30 feet, but it can be folded up within 7 minutes, so as to have but 10 feet width. The body of the aeroplane can be taken apart and packed likewise. M. Farman set out to make a practical flight with the aeroplane in the neighborhood of Paris, and left the Chalons camp at 8 o'clock in the evening with the idea of alighting near the city and of proceeding with a rapid dismounting of the flyer, so as to transport it quickly by road. This he was able to do very well, and he alighted in a very rough plowed field in the suburbs. Aided only by a farmer, he rapidly disassembled the machine and awaited an automobile, which then towed his dismounted biplane back to town at full speed so that it could be placed in an automobile garage. Thus it was shown that the Farman biplane can be handled very quickly in this way. On the flight it made an average speed of 75 miles an hour, and at the start it rose to a height of 300 feet in 50 seconds. This new biplane of Farman's is fitted with a 75 horse-power Gnome motor. On a previous test at Chalons, it carried on board 100 pounds of gasoline together with the pilot and one passenger and made 70 miles an hour. It could be packed up for transport in 7 minutes and 15 seconds.

Automobile

Early Self-starter.—That the self-starter is not new, is shown by the record of one American company manufacturing air-cooled cars. As long ago as 1902 a Syracuse man, John Wilkinson, owned a motor car, equipped with a motor starter of the compressed air type.

One Way to Stop the Cut-out Fiend.—Finding it next to impossible to prevent motorists from opening the muffler cut-out and emitting Gatling gun explosions, the Columbus (O.) City Council is considering a bill which would cause all muffler cut-outs to be sealed by a city official, for a fee of 50 cents. If at any time or place a car is found to have this seal broken or damaged, it means a fine—no further evidence being required.

Veracity and Value of Police Evidence.—A British lawyer whose client was arrested for speeding questioned the evidence given by the policeman, claiming that the man was incapable of judging speed or distance. He asked the officer the width of the courtroom, and received the answer "20 feet." The room was over 30 feet wide! The court subjected him to a test of time and the answers fell so far short of the correct, that the accused was let off free.

An Odd Engine Starter.—The problem of satisfactorily starting a gasoline engine has been attacked from a new point of view, the apparatus being somewhat similar to an old-style "priming attachment." Screwed into each valve cap is a small reservoir which contains gasoline. Into this gasoline dips an electric filament which receives its current from a battery, through a starting switch. When the current is switched on, the filament is heated and gasoline vapors are forced through a tube into the cylinders.

Reckless Use of Gasoline in Cleaning.—The acme of recklessness appears to have been reached by certain men in an Iowa public garage recently. Too lazy to use the more tedious method of washing oily articles with soap and water, they improvised a gasoline spray, with which they started cleaning grease-covered machinery. As might have been expected, the entire garage was soon converted into a giant carbureter, the mixture created by the gasoline vapors and the atmosphere within the building finally exploding with terrific force.

The Passing of the Horse in Cities.—Time was, and that not so very long ago, when the first thing the relatives of a sick person did was to cover the street in front of the house with straw so as to deaden all sounds from passing vehicles. The great number of rubber-tired automobiles has made this precaution unnecessary, and instead of the time-honored straw covering, there appeared a big sign at each street crossing near the "house of sickness," on which this sentence was painted in big letters: "Don't hoot! Illness!" Coincident with the appearance of this sign in Kensington, London, the London *Daily Mirror* published a trenchant editorial on the foolishness of taxing automobiles for the use of city streets. "The horse is a danger and a nuisance in the streets of a large city. We hear a lot of motor-car street taxes, but it is the horse which should be taxed, not the motor car. The horse is unhygienic, erratic and occupies too much space. Tax the horse as you would dogs, and leave the motor cars alone!"

A New Speed Indicator for Automobiles.—A new speedometer-tachometer of the hydraulic type has recently been introduced in this country from Germany, and while it is suitable alike to all manner of vehicles its chief interest naturally centers around its applicability to automobiles. It consists mainly of a three-cylindered pump, submerged in oil and actuated by a flexible shaft coupled to the front wheels. The rapidly revolving shaft causes the pump to force oil into a fourth cylinder, mounted alongside of the pump, in which a piston rises or falls according to the quantity of oil in the cylinder. At the bottom of this cylinder is a small orifice which permits the oil to return to the pump. The top of the piston is connected through a gear and lever system with a recording hand, and with a tape recorder on which all extraordinary motions of the piston and toothed disk recorder are printed together with the time of their occurrence. The recorder works in the following manner: As the speed of the front wheels increases or decreases, a valve covering the above-mentioned oil orifice is closed or opened more or less, thus permitting varying quantities of oil to escape and controlling the rising and falling of the piston. The smallest rise of the piston is greatly amplified by suitable gearing, so that the recording hand describes an arc of a circle sufficiently large to be easily recognizable. Interposed in this gearing and forming part of the transmitter is a disk fitted with a number of pins at certain intervals. When the piston rises, the disk turns, and as soon as the speed exceeds a certain arbitrary limit, contact with the pin at that point causes the type recorder to act, and an imprint of the time and of the excessive speed is made. In addition to these ordinary performances the recording device can be arranged to record every movement of the steering wheel, the brakes, the clutch, etc., so that a complete record can be kept of the entire movements of the car and driver, which might prove of extreme importance in cases of accident.

The Vacuum Cleaner in Cotton Mills

Modern Methods Applied to Industrial Sanitation

IN the earlier days of the industry cotton spinning as an occupation was notorious for its pernicious effects upon the health of the workmen. The air in the shops was laden with fine dust of cotton fibers and other floating particles derived from the raw material and the surroundings, and this, being breathed in day after day by the workmen, gradually choked up the fine passages of the lungs and rendered the men an easy prey to the attacks of disease germs. Tuberculosis of the lungs was a typical occupational disease of cotton spinners. And, indeed, a look at the last of the illustrations accompanying this article shows clearly enough the danger lurking in the cotton mill dust. For in this microphotograph we clearly discern not only the cotton fibers—none too desirable intruders in human respiratory organs—but also various sharp and angular fragments, which, entering the lung, lacerate its delicate tissues and start local irritations and wounds, favorite points of attack for the tubercle bacillus.

A particularly harmful operation in the cotton mill is that of "stripping" the carding engine cylinder, which is performed three or four times daily on each machine. In this procedure a cloud of dust is raised, which diffuses itself through the work-room, unless precautionary measures are adopted. One of the first improvements introduced was to place ventilating fans at suitable points, which drew the air, and with it some of the dust, out of the room and discharged it out of doors. But evidently this is at best only a poor remedy for the condition combated. With the development of modern methods has come a new system which is a vast improvement: a suction conduit leading from a hood over the stripping machine to the exterior. The hood is placed close to the point at which the pernicious dust is raised, and, in fact, incloses the stripping brush, so that the removal of the floating particle is practically complete. The principle employed is essentially that of the vacuum carpet sweeper. The entire stripping brush is inclosed in a portable hood, connected to a vacuum exhaust tube.

At first sight it may appear that the addition of such a hood and conduit to the stripping brush would add not inconsiderably to the burden of the workmen who have to carry the brush from machine to machine. The old type of brush weighed from 48 to 56 pounds. As a matter of fact, by careful attention to the material employed (aluminium) it has been found possible to make an entire brush and hood with an aggregate weight not exceeding 60 pounds.

There are several types of vacuum strippers. In some the dust is collected in a canvas bag, while the fiber is "stripped" from the brush separately. In another form of machine both fiber and dust are sucked off together, and the dust is then separated out by filtration. An idea of the nature and quantity of the dust thus collected and the fiber recovered may be obtained from one of the accompanying illustrations, in which *A* shows a basket filled with the dust, and *B* the corresponding valuable fiber recovered.

A School for Traction Engineers

IN the February 10th issue of the SCIENTIFIC AMERICAN an article appeared entitled, "Making the Tractioneer." This article gave to the reader an idea as to what is being done in the line of education of operators of farm tractors.

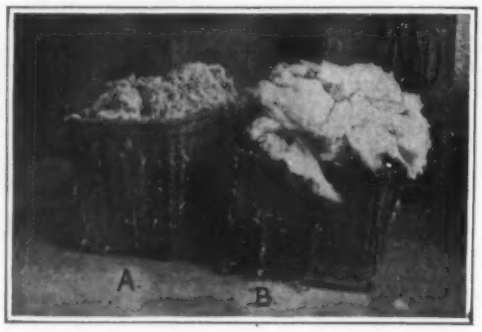
Since the appearance of the article in question a new institution has been organized, which aims to specialize on this type of education. The institution is known as the Indiana School of Tractioneering, and is located at LaPorte, Indiana. The school aims to teach that phase of engineering which will be of the greatest value to the farmer. It will not only instruct the farmer in the operation of his gas engine, but will also instruct him in all those subjects commonly grouped under agricultural engineering. There are a vast number of men in this country—farmers and mechanics—who apply engineering in their daily work, but who have had no training in engineering science. Many of these men are unable to get away from their work for any length of time to attend school, and many are unprepared to take up the instruction offered in engineering colleges. These men are not in need of a technical education such as is offered in a college or university, but need such instruction as will enable them to perform their work with greater efficiency. It is for this class of men that this school has been organized.

At present courses are offered in gas engines, power-farming, and agricultural engineering. The first course covers the operation of all types of gas engines. The power-farming course gives helpful suggestions on the best methods of applying engines to farm work with definite instruction on the operation of the various farm implements. The course in Agricultural Engineering takes up such important subjects as farm buildings, silos, the use of concrete on the farm, farm machinery, farm lighting systems, heating and ventilation of farm buildings, water supply systems, drainage and irrigation, and road building. It covers engineering subjects which are of special importance to the farmer.

Instruction is given by means of residence, correspondence, and traveling courses. The residence course is maintained at LaPorte, Indiana. Instruction in this school is given by means of lectures and recitations and by practical work on engines and other farm machines. Arrangements have been made whereby advanced students in the school may spend part of their time in a tractor factory in the actual building, testing and inspection of engines.

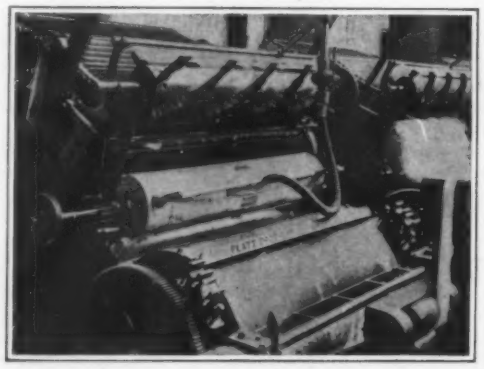
A correspondence course is offered to students who are unable to attend the residence school. Instruction by correspondence will be given in the same manner as such instruction is given in other correspondence schools with one exception. A traveling school will be maintained to give the required practice on actual engines for the students enrolled in the correspondence course. This school will visit points where a sufficient number of correspondence students are enrolled within reaching distance and give that part of the instruction which can best be given by the use of models and working machines. It is the plan of the school to combine the practical work offered at the traveling school with the instruction given by mail, so as to give the student the same opportunity of securing a well-balanced course as he would have by attending a residence school.

This part of the school's programme is entirely new, but it promises well to solve the question of bringing the school to the door of the student who is unable to get away for an extended course at a residence school.

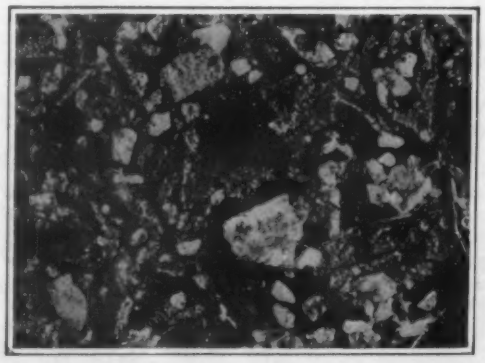


Useless dust (A) collected in the bag, and valuable fiber (B) recovered from the stripping brush.

Vacuum stripper at work on the main cylinder of carding engine.



View of stripper, showing hood inclosing one of the stripping brushes and connected to a vacuum pipe.



Microphotograph of stripping dust. Note the sharp angular fragments as well as the cotton fibers.

Sesame Culture in the Southern States

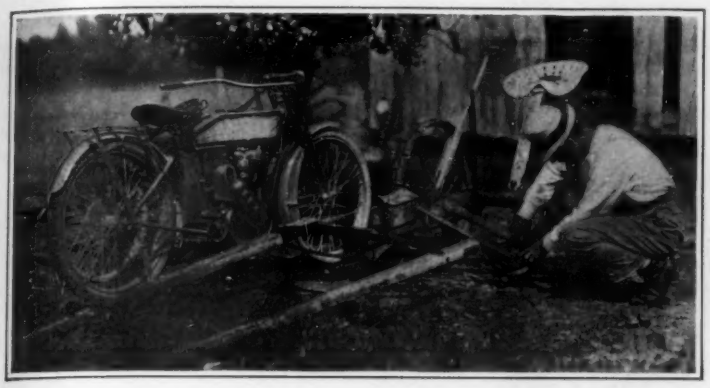
SESAME or benne plant (*Sesamum orientale* Linn.) is a native of India, and is now being cultivated in nearly all tropical and semi-tropical regions of the world. The plant is a hairy, sticky annual, about three feet high, and produces an abundance of small, flat, pear-shaped seeds. It was first introduced into the United States before the middle of the seventeenth century, and was cultivated successfully as far north as Burlington, New Jersey. It ripens its seeds in most of the Middle States. Sesame is admirably adapted to the dry soil in the southern part of the United States, Mexico, Central America, Colombia, British Guiana, and other parts of South America. Within a comparatively few years its culture has been undertaken in Germany, France, and England. In Mexico it flourishes in soil scarcely suitable for any other crop, and it is quite probable that the center of the sesame industry in the western hemisphere will soon develop in that country and the southwestern United States, where a good deal of land is allowed to lie idle because it is unfit for most of the other farm crops. The negroes near Charleston, South Carolina, are said to have grown sesame in a small way for over two hundred years.

The United States Department of Agriculture is now conducting experiments in the Southwest, and the results thus far attained show conclusively that in many parts this crop will richly repay for planting. The next step on the part of the department officials is to find a market for the crop, and they are now endeavoring to interest the confectioners to use the oil, which is at present obtained from Marseilles in France, where the greater proportion of the commercial oil is expressed.

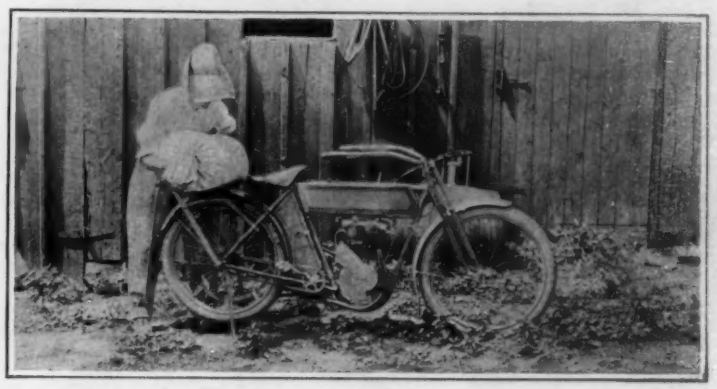
The chief merit of this crop is that it requires very little cultivation of the soil. It is sown in shallow drills usually from three to four feet apart and about twelve inches apart in the rows. Sowing takes place as early in the spring as possible. In the southern States it requires from the first of April to June for the crop to ripen, but the plants are left in the field until autumn, when the leaves fall off. The stems are then cut, bound in sheaves and stacked in the field to dry. When the oblong pods or capsules which contain numerous small seeds are thoroughly dry, they burst open. A piece of cloth is then spread out on the ground and the sheaves are shaken over it so as to gather the seeds.

An abundance of yellow, mild and bland oil called "gingelly," resembling olive oil, is obtained from the seed. If the oil is of a very good quality, it is employed as an adulterant of oil of almonds, and is of great economic value, only second to cocoanut oil in the variety of its uses. It is employed for culinary purposes, food, medicine, cosmetics, illumination, lubrication, soap-making, etc. The oil is also used in making a very attractive confection, being used like peanut in making a "brittle." The cakes left after the oil has been pressed from the seeds are used as food by the poorer classes and also serves as good food for cattle. The negroes of Mexico are in the habit of crushing or grinding the seeds into a meal for the purpose of making a drink like coffee. The narcotic properties are very pronounced.

The demand in the United States for gingelly oil is constantly increasing, and although the price of the seed is rather low there is undoubtedly a favorable opportunity for developing sesame culture in the Southern States. In case of its production on a scale larger than it is at present it would soon become an economical question, and the price of both seed and oil would increase in value.



A trip to town for a bolt takes little time.



A sack of feed fits on behind.

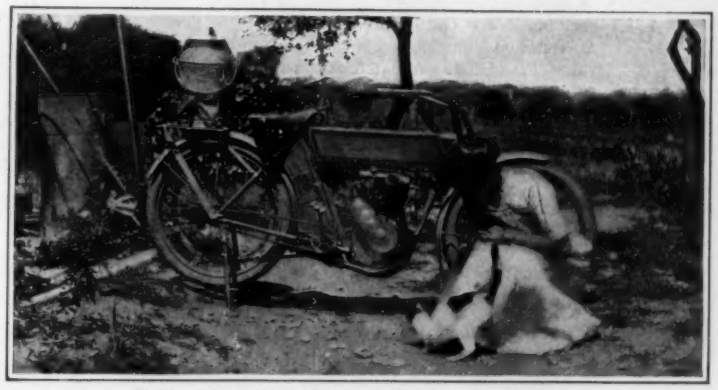
The Motorcycle and the Farmer

By J. M. Palmer.

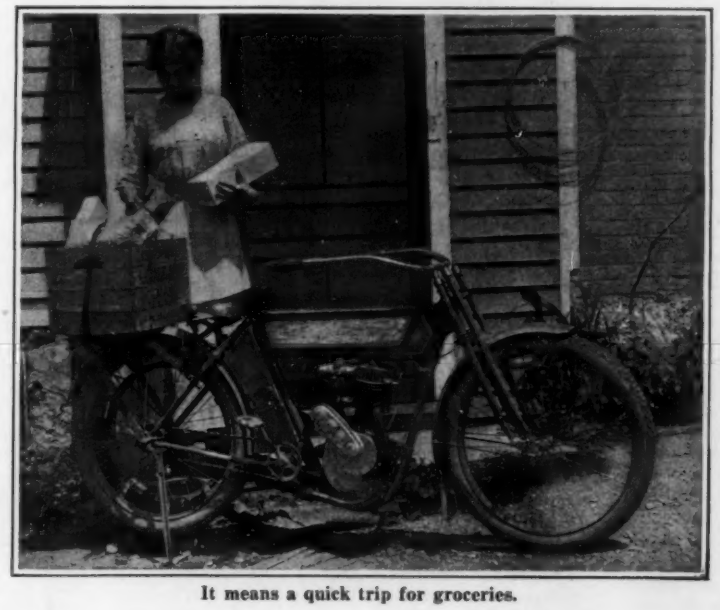
A MOTORCYCLE is a luxury to the city man, but to the farmer it is both a luxury and a business necessity. After the chores are done he can get on his machine, go to town in fifteen or twenty minutes, go to the theater, or spend the evening at the club or park, and not have to put in three or four hours on the road behind the family plug. The motorcycle needs very little care; is inexpensive to operate, and is a piece of machinery that every farmer who can afford it should have.

Leaving out the pleasure side, the motorcycle is very useful on the farm in making quick trips to town. Maybe the housewife finds that she is going to run short on groceries for dinner. It is only a matter of half an hour to make a trip to town and get the needed supplies. Suppose it is during the wheat harvest and the work is rushing; a bolt or casting is broken and the whole crew is thrown out of work. You can make the trip to town on your motorcycle, get the needed part and have the machine in running order in less than an hour, while if you had to hitch up the family horse and make the trip it probably would take half a day. A motorcycle is very handy in case of emergency. Speed in getting the doctor or some medicine has saved many a life.

Every motorcycle should be equipped with a luggage-carrier. With one of these a load of eight or nine hundred pounds may be carried. One carrier may be attached back of the seat and another in front of the handlebars. In this way a motorcycle may be used in making butter deliveries in town, and taking vegetables and other products to market and exchanging them for groceries and other necessities. A chair attachment may be used on the front of the motorcycle and a luggage-carrier on the back. Two persons can ride then, for pleasure or business.



Taking the cream to the station is a small chore.



It means a quick trip for groceries.

Some persons who own motorcycles use them to run the washing machine, churn, cream separator, and other farm machinery. A belt is attached from the rear wheel to a flywheel on the machine. This is using a motorcycle to a great advantage, but according to a motorcycle expert it should not be used for running machinery. A motorcycle engine is made to be air-cooled, and this will not be properly accomplished unless the machine is in motion. The engine should not be run more than three minutes, standing still, or the piston may begin to stick. The guard must be removed when belting it up, and on some machines this requires considerable time. The machine must also be held steady or it will throw off the belt. This is usually accomplished by means of a rope. If the belt comes off it may get mixed up with the wheel, causing considerable damage. A motorcycle engine will not do its best work unless it is running at about 1,000 revolutions a minute, and this is almost too fast for the average piece of machinery. Some arrangement is needed to reduce the speed. A counter-shaft usually is used for this purpose.

It is not a paying proposition to use a valuable motorcycle engine to run machinery, when a stationary engine can be obtained for a low price to do the same work. In other words, using a motorcycle engine to do this kind of work is like using a fine driving horse for the heavy work on the farm.

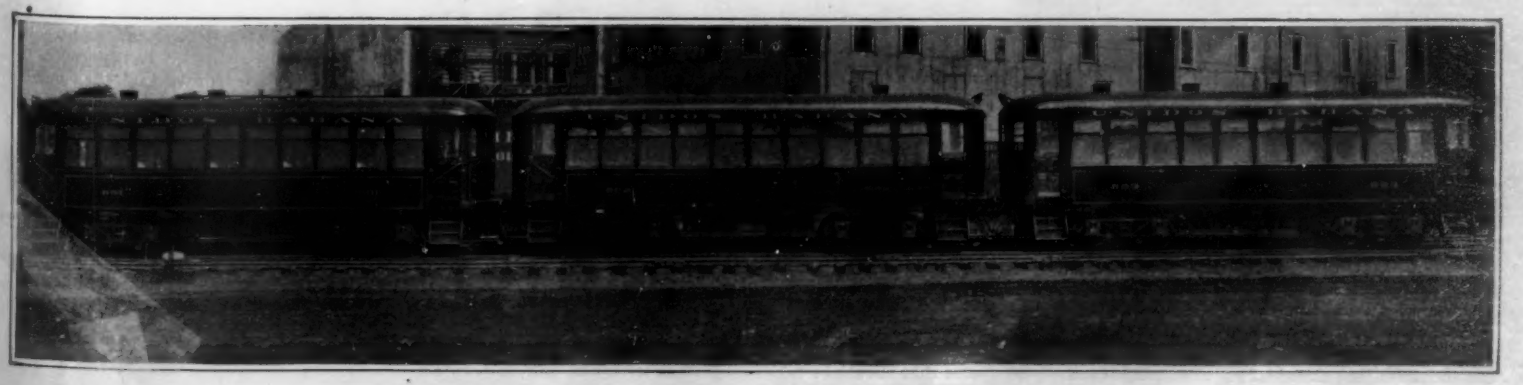
The First Storage Battery Train

THE United Railways of Cuba have ordered an electric storage battery train for use on a line running about one hundred miles out from Havana. Heretofore, this line has operated a train consisting of a steam locomotive drawing a single coach. In its place a train consisting of three cars equipped with Edison storage batteries will be used.

A test of this train was made last week over the Long Island Railroad, running from the Pennsylvania Station to Long Beach, a distance of about twenty-five miles. The train was equipped with the multiple unit control; in other words, the separate motors on the cars are operated by a single controller. Each car is equipped with 216 cells of Edison battery, furnishing 200 volts to the motors. The cars are mounted on double trucks and each car carries four motors. The cars measure thirty-five feet and five inches in length and are provided with four double seats and four end seats having seating accommodation for forty-two passengers.

The twenty-five mile trip to Long Beach was covered in fifty-seven minutes on the trip out and fifty-three minutes on the return. When Long Beach was reached, the batteries were recharged from the third rail of the Long Island Railroad system, the time of recharging occupying twenty minutes. When the round trip had been completed it was ascertained that the train had consumed four kilowatts per train mile, which at the rate of one cent per kilowatt amounted to $2 for the entire trip of fifty miles. The mileage capacity of the batteries is from 60 to 100 miles for seven hours of charging.

The great advantage of this form of battery is that it may be recharged at frequent intervals at far above the normal charging rate. This periodical recharging or partial charging is known as "boosting." For instance, in Washington a car is being operated over a four-mile line, covering this distance in fifteen minutes. There is a delay of three minutes at each terminal, which is occupied in changing the fenders and giving the conductor an opportunity to reset his



Storage battery train with multiple-unit control built for the United Railways of Cuba.

register. This three-minute period is sufficient for recharging the batteries at five times the normal rate, with sufficient energy to carry it to the other terminal. The car covers 204 miles per day and the battery is not charged at any other time except during the stops at the terminal.

As the Edison storage battery is of a very rugged character and practically fool-proof, no trouble is anticipated with the operation of the storage cars in Cuba. As to the life of the batteries, no figures can be given at the present time for the reason that no batteries of this type have been in service long enough to determine their full life. Batteries have been used for six years without showing any material depreciation.

The cars in which these batteries are installed are of a very different construction from the ordinary railroad car. The main object has been to reduce weight as far as possible. The same principle has been employed in their construction as in the car described in our issue of February 5th, 1910. The design was developed by Mr .Ralph A. Beach, who assisted Mr. Edison in adapting his storage battery to traction.

A 7,500 Horse-power Pelton Waterwheel

THE realization of the fact that the sources of the supply of nitrogen, upon which animal and vegetable life so largely depend are strictly limited, and that the consumption of nitrogen compounds is growing at a heavily increasing rate, has led to a close study of the means of increasing the supply of nitrogenous compounds.

The most promising and certainly the most lavish source, from which to draw nitrogen for the manufacture of the greatly-needed compound, is the atmosphere, and this branch of the nitrogen industry is growing at such a rapid rate that it promises to become, ultimately, one of the largest in the industrial world.

The same natural conditions of an abundant supply of hydraulic power, which caused the first plant for the fixation of nitrogen in the United States to be located at Niagara Falls, has turned the attention of the capitalist to Norway, whose lakes and rivers, with their lofty elevation and rapid fall, provide ideal conditions for the cheap production of hydro-electric power. Of the several plants in that country the most interesting is that which utilizes the Rjukan Fall, which constitutes the principal fall in the descent of the Maana River through which the waters of Lake Mosvand find an outlet into Lake Tinn. Lake Mosvand is a body of water, with a surface of twenty-three square miles, which lies at an elevation of three thousand feet above sea level. By means of a dam the level of the lake is raised over forty-six feet, and the water power available is increased from 30,000 to 250,000 horse-power, at an outlay of a little less than $2 per extra horse-power.

Five miles below the dam another dam forms the intake for the power station, and from this intake the water is led through a tunnel to a reservoir formed at the brow of the cliff near the Rjukan Fall. The tunnel is 2.6 miles long and has a descent of one in 300. A thousand feet below the terminal reservoir of the tunnel is the power station, which is located on a shelf in the face of the cliff. The water is led from the reservoir on the mountain side to the power station through ten large flumes, placed side by side. The flumes are five feet in diameter, the upper sections being built of riveted steel plate, the lower sections, where the pressure reaches 450 pounds to the square inch, are made of welded plates one inch in thickness. The water descends 971 feet to the turbines. The effective height after deducting losses through friction, etc., is 909 feet.

After leaving the power station, the water enters another tunnel excavated in the side of the cliff and extending 3.1 miles down the valley. It there enters another series of flumes, through which it drops 909 feet to a second power house, which is a duplicate of the one mentioned above.

The upper power house is completed and the lower one is now under construction. In the Vemork power house, as it is called, are ten units each of 15,000 horse-power, with a maximum capacity of 17,500 horse-power. Each unit consists of two large Pelton waterwheels, installed side by side on common shaft, upon which are mounted also double generators. A three-phase, alternating current of 50 periods is transmitted from this power house to the nitrate works, through sixty wires, partly of copper, but chiefly of aluminium. The working voltage is 10,000. The Pelton waterwheel, which is very extensively used in the mining districts of the mountains of our Western States, is particularly adapted to very high pressures and relatively small volumes of water. The early wheels were small and were run at extremely high velocities; but of late years it has been recognized that this type of wheel can be built in larger sizes and run at rates of revolution, which render it possible to direct-connect it to generators of large size operating at moderate rates of speed.

At the Rjukan installation the water is delivered in two jets of high velocity. It strikes on the raised center of the cups (see front page illustration), and is deflected to each side, leaving the cups in a direction which is tangential to their outer edges. The direction of motion is changed nearly 180 degrees. Theoretically, the velocity of the cups should be equal to one half the velocity of the jet, and in this case the efficiency of the wheel would be 100 per cent. There is a loss of efficiency, however, due to the friction of the water in the cups and the energy loss due to the loss of velocity of the water as it leaves the cup. In well-designed wheels of the larger sizes, however, the efficiency has been carried up to about ninety per cent.

The International Rubber and Allied Trades Exhibition

THE International Rubber and Allied Trades Exhibition was formally opened at noon on September 23d, in the Grand Central Palace, New York city. An enormous amount of raw rubber was exhibited, the value of which is estimated at about $400,000.

In a felicitously worded speech, Commissioner Calvin Tomkins, who represented Mayor Gaynor, dwelt upon the importance of the rubber industry to America.

"Ever since the rubber industry as we know it began to develop with the discovery of vulcanization," said Mr. Tomkins, "America has been the principal user and manufacturer of rubber. To-day we use more than one half of the total production of the world's raw rubber, and in value the output of the finished product equals the value of steel production."

"In this great and representative exhibition two things especially will strike most people: first, the fine machinery, mostly American, which is employed either in working the rubber in its earliest and crudest stages or in utilizing it in its finished forms for all sorts of purposes, from hose to overshoes, from tires for automobiles to toys for the nursery, from deep sea cables to flooring, such as that over which those attending the exhibition will walk when entering the hall. The second striking thing is the rivalry—a perfectly friendly rivalry, but a very serious rivalry—which exists for premier position in the market between what is called wild rubber and plantation or cultivated rubber.

"Brazil is the home of rubber. Without the fine trees of the Amazon forest, which for centuries have been yielding the precious milk from which rubber is made, a mighty industry would have been impossible. It was hardly to be supposed that so valuable a national asset would be allowed to develop without rivalry. Thirty-five or thirty-six years ago some thousands of seeds were taken from Brazil and planted in India, in Ceylon and in the Malay Estates. The results of the successful germination of these seeds has been so remarkable that within a couple of years or so from the present time, the output of plantation rubber will probably be at least as great as that from Brazil.

"As the world's consumption of raw rubber bids fair to exceed one hundred thousand tons a year—apart, that is, from the enormous quantities of reclaimed rubber which are used every year—we have here a very interesting situation, which is being watched with eager attention, not only in Brazil and in the East, but also by the manufacturing markets of two continents.

"Rubber has become indispensable to the progress and civilization of the world. Great scientific minds are devoting themselves to the elucidation of the many problems it opens up. The laboratories of Europe and America are engaged in a ceaseless round of experiments, both as to the character of the rubber and the uses to which it may be put. Some day we are even promised rubber roadways and silent cities. The support given to this exposition has been world wide. Twenty governments are represented, and among those who are taking part in it are the Philippines and the Hawaiian Islands. I understand that there are one hundred foreign delegates to the Rubber Conference which is to be held in connection with the exhibition—experts in rubber growing, rubber chemistry, and rubber manufacture—who will contribute addresses and papers, the value of which cannot be over-estimated."

The International Congress of Hygiene and Demography

ACCORDING to the official estimate, fully ten thousand persons visited the exhibition in connection with the International Congress of Hygiene and Demography on September 22d. The exhibits are essentially popular in character. Tables, diagrams, mottoes concerning the use of alcohol and the trouble resulting from it; the nature of various diseases, and the measures that should be taken to prevent infection or contagion are striking features of the exposition. Boy scouts will give regular-hourly drills, athletic exercises and exhibitions of methods of rendering aid to injured persons, in cooking, in cleaning tents, etc. There is a municipal bathing pool which will be used for the water events. An area of approximately twenty acres will be used for the various camps and exercises. More than one thousand children from various playground associations will participate in playground contests.

Every day there will be practical demonstrations of treatment of live patients and dummies will be used for surgical operations. Every organ, muscle and ligament and bone in the human body is represented in the dummies. There is a model field hospital equipment which is said to be the finest of its kind in the world. There are three health exhibit cars, which were sent one each from Maryland, Louisiana and California. The California and Louisiana cars contain maps, photographs, charts and models dealing especially with the problems of health and sanitation in rural districts, some of them being planned on novel and impressive lines. A course of hourly lectures is given in each of these cars.

The Congress itself was opened by President Taft. The address of welcome was made by Dr. Max Rubner, of Berlin.

When the roll of nations was called, delegates from thirty three foreign States answered. Among the more prominent were Sir Thomas Oliver of the University of Durham College of Medicine, Newcastle, England; Dr. Jacques Bertillon, Chief of the Bureau of Municipal Statistics, Paris, a brother of Prof. A. Bertillon, the criminologist; Dr. Friedrich Zahn, Director of the Bavarian Municipal Office, Munich; Dr. Arbold Netter, of the Faculty of Medicine, Paris; Major-General Eugene de Kontwokski, St. Petersburg, Russia; Prof. Shibasaburo Kitazato, of the Japanese Imperial Institute for the Study of Infectious Diseases, Tokio; Dr. Francis Harbitz, of King Friedrich University, Christiania, Norway; Dr. Carl Landsteiner of the University of Vienna; Dr. Alfred Pettersson of Stockholm, Sweden; Dr. Paul Romer, of the Hygenic Institute, Marburg, Germany; Dr. Lucien March, Director of General Statistics, France; Dr. Alfredo da Graca Couto of the Federal Department of Health, Rio de Janiero, Brazil; and Dr. Lugi Cadliani of the University of Turin, Italy.

Types of Aeroplanes for Military Service

UNTIL further notice, the intention of the Army aviation service is to purchase and use only two types of aeroplanes.

One type will be known as "Speed Scout" aeroplane. This type is desired particularly for strategical reconnaissance, carrying only one aviator without passenger, and having a radius of operation of about 100 miles and a speed of not less than 65 miles per hour. With this type of aeroplane a military aviator is expected to locate and report large bodies of troops. This machine should be capable of ascending at the rate of about 600 feet per minute.

The second type will be known as "Scout" machine. It is desired for reconnaissance service when hostile armies are in contact or approaching contact. This service requires a weight-carrying aeroplane, the crew consisting of two aviators, capable of relieving each other as observers; the aeroplane should be provided with radio equipment. This type of aeroplane should remain in the air at least three hours to permit the observers to locate smaller bodies of troops accurately upon a map, make sketches, military photographs, etc. The Scout aeroplane should have a speed of not less than 45 miles an hour; the maximum speed must not exceed 60 miles per hour. It should be capable of carrying a useful weight of 450 pounds, and with this weight ascend at least 2,000 feet in 10 minutes. The chassis must be designed so that it is capable of landing on and arising from soft ground, such as harrowed fields.

Porous Metals

USING an alloy of lead and antimony, containing 90 per cent lead, and one of tin and lead, containing 80 per cent of tin, Hannover has obtained both porous lead and tin. The porous lead thus obtained may be used for many purposes, and would be especially valuable in making accumulator plates of very large capacity.

The Most Costly Porcelain Service

AT an exhibition of works of art, at present being held in St. Petersburg, there may be seen a set of porcelain dishes which is considered the most costly in the world. It consists of 36 hand colored plates. This set has an estimated value of 36,000 rubles ($18,540), a single plate, therefore, being worth 1,000 rubles ($515). It is the property of Count Orloff-Davidoff.

Correspondence

[The editors are not responsible for statements made in the correspondence column. Anonymous communications cannot be considered, but the names of correspondents will be withheld when so desired.]

The Columbia River Jetties

To the Editor of the SCIENTIFIC AMERICAN:

In the SCIENTIFIC AMERICAN of August 24th, 1912, on page 160, is an article headed "The Harbors of the Pacific Coast." In this article is a statement regarding the time necessary to complete the project for a deep-water entrance at the mouth of the Columbia River, which has been very harmful to this port, and which is so far from the true facts, that we have asked the United States engineers to furnish a correct statement of the matter, a copy of which I am inclosing. We would ask that you publish same in at least as prominent a position as was the article which it is proposed to correct. PORTLAND CHAMBER OF COMMERCE,

By EDMOND C. GILTNER,

Portland, Oregon. *Secretary.*

[We take pleasure in publishing the following letter of Major McIndoe. Mr. Ballou informs us that the statements in his article were based on the last annual report of the Chief of Engineers, U. S. A.—EDITOR.]

Edmond C. Giltner,

Secretary, Chamber of Commerce,

Portland, Oregon.

1. Referring to your letter of September 12th, 1912, inclosing a clipping from the SCIENTIFIC AMERICAN relative to the jetties at the mouth of the Columbia River, I wish to say that I read the article about a week ago and made note of it with the intention of writing to the Editor, calling his attention to the erroneous statements published in the paper prepared by William Hosea Ballou, Sc.D.

2. Instead of only about 19,000 feet of the south jetty being completed on the first of June, 1912, this jetty was practically seven miles long and nearly completed, the only work remaining to be done at that date being the completion of the groins, extension of jetty apron, and the filling up of some low places, which work should be entirely completed in about six working months. Instead of "twelve years to complete the present south jetty," it is confidently expected that it will be completed in the early spring of 1913, and that its maintenance will not require the dumping of more than a small amount of rock in the next few years, while the trestle remains serviceable.

3. The proposed north jetty, instead of being two thirds as long as the south jetty, is only a little over one third as long, and should not cost more than one half the amount expended on the latter. Instead of sixteen years to complete the north jetty, as stated by Mr. Ballou, a most liberal estimate would be six years, so that Portland can hope for the full depth which the jetties will give across the bar in about seven years instead of "twenty-eight years." Preliminary work for the north jetty, including construction of receiving wharf, storage yards, etc., is now well under way, and it is hoped that dumping of rock in the north jetty can be commenced during the summer of 1913. Within one year after the construction of the north jetty is begun, it is expected that its effect on the bar will be noticeable by increased depths, and that this increase of depth will continue with the advance of the jetty work until the desired 40-foot channel results.

4. During the fiscal year ending June 30th, 1912, the best channel remained fixed in position, the survey completed in June, 1912, showing it to be almost exactly in the same position as in June, 1911.

(Signed) J. F. MCINDOE,

Portland, Oregon. *Major, Corps of Engineers.*

The Flight of Projectiles

To the Editor of the SCIENTIFIC AMERICAN:

An article on the flight of projectiles by Rear-Admiral N. C. Twining, U. S. N., appeared in your issue of August 17th.

He states that a projectile must move nearly point on throughout its flight, owing to the fact that retardation from the resistance of the air is less toward the end of its flight than at the beginning, which could not be if the projectile traveled more or less sidewise toward the end of its flight.

He states that the point of the bullet deviates farther from the trajectory as the range increases, and that this increased deviation causes drift.

That is, according to the first contention, the point of the bullet deviates no more, and probably less, from its trajectory toward the end of its flight than at the beginning, whereas, according to the second contention, the point of the bullet deviates more from its trajectory toward the end of its flight than at the beginning.

These two contentions contradict each other, and one at least must be wrong.

He compares the twist of a baseball to the twist of a bullet. This comparison seems wholly visionary when it is considered that a baseball is rotated on an axis more or less at right angles to its trajectory, whereas a projectile is rotated on an axis practically identical with its trajectory.

I offered some years ago to demonstrate to the authorities of Canada, Britain, and the United States as well as to numerous manufacturers the cause of drift and other things, and to point out how shooting, especially with small arms, could be very much improved with little or no increase in cost, but no notice was taken of the offer.

I could not get opinions from any of these people concerning the flight of projectiles.

The article in your issue of August 17th seems to demonstrate that little or nothing is known concerning the flight of projectiles by those in a position to make use of the knowledge. C. C. GRANT.

Red Deer, Alberta.

Another Card Puzzle

To the Editor of the SCIENTIFIC AMERICAN:

I have read with interest the description of the "four island" card puzzle in a recent issue of the SCIENTIFIC AMERICAN and it recalls another card puzzle which I will now describe. Let a person take a pack of cards, remove the joker, and then lay out three piles, lapping the cards of each pile one upon the other so that the denomination of the lower or initial card of each pile can be seen. In placing the piles, count from the initial card up to ten, then if the initial card be a six, count on that seven, eight, nine and ten or four cards just as they come from the pack. If the initial card of the second pile be a seven, place on that cards to count up to ten, or three cards, and if the initial card of the third pile be a five, it will require five cards to count up to ten. The game is for the player without seeing the three piles to tell the sum total of the spots or numerical values of the three initial cards, the party placing the piles to give the player the balance of the deck after he has placed the three piles. This sum total the player can readily determine by subtracting nineteen from the number of cards in the balance of the deck handed him by the party. In showing the puzzle the player can stand with his back to the other party when the cards are being placed in the three piles, and while the explanation of the trick is simple, it is at first mystifying. The face cards can be given any desired number value in playing the trick, care being taken that the value so given is the same in starting the card piles and in calculating the total values of the initial cards. OBSERVER.

Washington, D. C.

The Bureau of Chemistry

To the Editor of the SCIENTIFIC AMERICAN:

To designate the methods of the Bureau as "unscientific" is not fair, as it is not in accord with fact. The chiefs of divisions, the laboratory chiefs, and the laboratory asistants, one and all, are men of high educational qualifications. All are university graduates, and many of them have done considerable graduate work. Furthermore, most of them have had considerable practical experience in the study of food materials in field and in factory. The Referee Board does not and cannot check up the work done in the several United States food and drugs laboratories. This Board is authorized to investigate and to report upon certain problems under dispute. The Board does not in any way direct or control the work of the several laboratories. While I fully admit the usefulness of the Referee Board, I do not admit that its maintenance is an absolute necessity. I believe, however, that for a few years more, the Board will be a benefit.

You make certain allusion to differences of opinion between interested manufacturers and those whose duty it is to enforce the law. My dear sir, every manufacturer of foods and drugs, even though he knows that the articles manufactured are useless and harmful, will declare most emphatically against the findings in the pure food and drug laboratories. These interests will very naturally oppose anything which hurts their business. Your charge of incompetence against the Bureau is not in accord with the facts we already pointed out. The analysts in the laborntories are not only highly qualified, but they are scientifically honest, knowing full well that any attempt to "prepare cooked-up evidence" would certainly be discovered in the several "checks" to which every analytical laboratory report is subjected (by laboratory chief, division chief, chief of bureau, and check analyses).

It is indeed much to be regretted that crooked manufacturers with money enough to fight in the courts have time and again diverted and annulled the ends of justice. We are all satisfied that nostrums and fake remedies should not exist, and the manufacturers thereof should be punished under the law. It is true some have been brought to time, but not all. We would indeed be pleased to be informed how these offenders may be more generously and more expeditiously punished. The Bureau is doing all it can.

You criticise the division chiefs in the Bureau, with special reference to Bigelow, Kebler, and Doolittle. The last one named has been "acting chief" of the Bureau since the resignation of Dr. H. W. Wiley, and in the capacity of mere "filler in" he has been doing remarkably well. Bigelow and Kebler have done many years of most efficient work; their ability, honesty, and integrity have never been questioned. If they have often failed to bring wrong-doers to justice, the fault has, as a rule, not been theirs, which brings me to my closing statements.

1. The Bureau of Chemistry is sorely in need of older, more experienced, better qualified assistant U. S. district attorneys. In fact, the administration of the Pure Food and Drugs Act calls for attorneys having special educational and experience qualifications. The Bureau has time and again lost cases simply because of the inefficiency of the assistants assigned to the cases by the U. S. District Attorney.

2. The Bureau must not have in its personnel anyone who is not heartily in sympathy with the enforcement of the spirit of the Pure Food and Drugs Act. This should apply to all divisions of the Bureau, inclusive of laboratory assistants. This has not been the case in the past, as all informed persons know.

3. For some time to come, the Bureau should center its efforts upon the flagrant transgressors and bring these to time. This will keep all hands busy for say ten to fifteen years. Afterward we can take up the minor technical offenders.

4. The Bureau will no doubt welcome all help and good advice. The Bureau pays no attention to knockers.

San Francisco, Cal. ALBERT SCHNEIDER.

[Our correspondent is not familiar with the conditions in the Bureau of Chemistry.

He is wrong, for example, in assuming that the chiefs of divisions are men of high qualifications. Mr. Bigelow, for example, is not regarded by scientific men as an authority on food chemistry. It is impossible to find any authoritative work of his which would entitle him to serious consideration as a physiological chemist. We have no question that he is an honest and zealous official; but we do question his scientific competency to pass upon very important and very novel questions that involve the health of ninety million people. Dr. Kebler is a graduate of Michigan University and of the George Washington University. He has never performed any research work of the character which would entitle him to be regarded as eminently qualified to hold the important position that he does. Moreover, in the Chattanooga trial of the Coca-Cola case, it appeared that in experiments conducted under his direction, rabbits had been drowned instead of poisoned (as he supposed) by running a tube down their lungs instead of their stomachs. That is sufficient evidence of his scientific incompetence. Like Mr. Bigelow, we have no doubt that he is honest and zealous; we simply doubt his scientific ability.

Mr. Doolittle was once State analyst for Michigan. The appointment was made in the face of very hostile criticism; for Mr. Doolittle's competency was very much questioned. He has never done original work of such a character that scientific men regard him as an authority on physiological chemistry or the chemistry of food.

We agree with Mr. Schneider that there are many men in the Bureau of Chemistry whose educational qualifications are high, who have done remarkably able work in their special fields and who may well be regarded as true scientists. But the trouble is, under the present administration, it is impossible for these men to do effective work.

It is true that the Referee Board does not and cannot check up the work done in the several United States food and drug laboratories. But the Board does and can check up disputed matters. The benzoate of soda investigations were made by a medical student who had not even an M.D. He graduated from an institution which Dr. Abraham Flexner of the Carnegie Foundation for the Advancement of Teaching considered poorly equipped for the purpose of imparting medical instruction, and the discontinuance of which institution Dr. Flexner strongly recommended. Naturally, when men like Dr. Remsen repeat the experiments on a larger scale and with greater scientific care, the result is quite different. What would we have done without the Referee Board in the benzoate of soda and other cases? If ever there was a shining example of scientific incompetence, we find it in the manner in which these benzoate of soda studies were conducted. It would be absolutely unnecessary to maintain a Referee Board if the Bureau of Chemistry did its work with the scientific care that we have a right to expect from a Government institution which has unlimited funds to spend.

We agree with Mr. Schneider that interested manufacturers will do all in their power to evade the Pure Food and Drugs Act. Our point is that they find evasion particularly easy because of the incompetence of the Bureau of Chemistry.—EDITOR.]

Captain and officers of the "Patterson," flagship of the Fourth Group of torpedo-boat destroyers.

Landsman's Log Aboard the United States Destroyer "Patterson"—I

By J. Bernard Walker

The present series of articles is a record of impressions gathered by the Editor, on a week's cruise aboard the destroyer "Patterson," during the summer maneuvers at the eastern entrance to Long Island Sound.

Through the signalmen and the wireless the flagship sees, hears and talks with the fleet.

IT was a faultless July morning when we took a motorboat at the docks at Newport, Rhode Island, ran around the breakwater which extends from the island on which the torpedo station is located, and drew alongside the gangway of the United States destroyer "Patterson." Looked at from the water, the great length and generous freeboard, and particularly the lofty fore deck of the vessel, combined to give an impression of power and seaworthiness which was very convincing. From the flimsy "boat" of twenty to twenty-five years ago the torpedo craft has developed into the "ship," strong, swift and seagoing. The impression was deepened as I stood on the main deck and took in the long sweep of her, from the break of the forecastle to the taffrail at her stern; and again when I went forward and entered the comfortable officers' quarters below the forecastle deck.

Here an alleyway on the starboard side terminated in the captain's cabin, a commodious room extending across the ship, where I received a cordial greeting from Capt. John M. Luby, commanding the fourth destroyer group. Aft of the captain's cabin, on the port side, are three officers' staterooms, in one of which the writer was most comfortably domiciled. Aft of these is the wardroom mess, a snug little room with comfortable seating accommodation for four at the dining table. Adjoining this, to port, is the officers' galley.

At the break of the forecastle are two 3-inch semi-automatic guns, one on each beam, the forecastle structure being cut away so as to permit these guns to fire dead ahead. Amidships on the main deck, one on each beam, are two twin 18-inch torpedo-tubes, mounted so that they can be swung through a wide arc by a man who, seated above the tubes, with his eye at a telescopic sight, trains them with great accuracy upon the target by means of a wheel not unlike an auto steering wheel. Amidships on the main deck is another 3-inch gun, and astern are a third twin torpedo-tube and a 3-inch automatic gun. Forward on the forecastle deck is yet another 3-inch gun, making in all five of these effective pieces.

Below the main deck are storerooms, berthing spaces for the crew, the two boiler-rooms, each containing two oil-fired water-tube boilers, the turbine-room, additional berthing space for the seamen, the quarters of the petty officers, and astern of all the doctor's stores and other general stores of the ship.

While we were waiting for the signal to weigh anchor and proceed to sea, the writer took the opportunity to gather a few particulars of dimensions, etc., and incidentally receive an impression of the ship, particularly in regard to that remarkable lightness of construction which we have all come to associate with the torpedo boat and the destroyer. The "Patterson" is nearly three hundred feet in length over all, or to be exact, two hundred and ninety-four feet. Her molded depth from main deck to keel is sixteen feet; draught, eight feet; beam, twenty-seven feet. The main deck is about nine feet above the water line, the forecastle deck seventeen feet above the same level, and the bridge about twenty-four feet. The ratio of length to beam is one to eleven; a proportion which will enable the reader to understand how extremely fine are the lines of these phenomenal craft. The complement of the "Patterson" is four officers and eighty-five men, and her normal displacement is about seven hundred and sixty tons. She is driven by turbines operating three propellers, and on her trials she indicated about 15,000 horse-power and attained a speed of slightly over thirty-three knots.

My first impression of the destroyer as the result of that half hour's inspection was of the thoroughly workmanlike appearance of the ship, due to the absolute absence of anything of the ornamental. It is true, she exhibited all the characteristic orderliness of a naval ship; but there was everywhere evidence that a torpedo-boat destroyer is designed for arduous and dangerous service, and built with a sole eye to securing a maximum efficiency for every pound of material and dollar of expense.

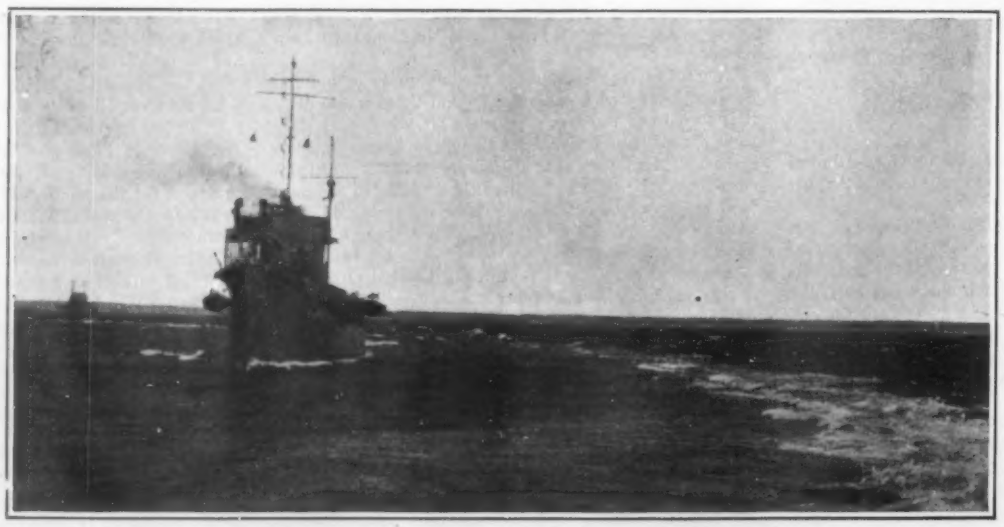
Structurally the most wonderful thing about the "Patterson" is the combination of lightness and strength in her construction. Remembering that she is about three hundred feet in length, and that the bending stresses, tending to break her back when she is being driven into head seas, must reach a very high figure, it is astounding to learn that her keel plate is only 5/16 of an inch in thickness, her garboard strake and maindeck stringer 1/4 of an inch, and that the rest of the plating on sides and deck is 3/16 of an inch in thickness only. Equally light is her framing: 3-inch bulb angles for the frames, with deeper, 9-inch web frames at every twelve feet of her length. Considerable transverse stiffness is afforded, however, by the eleven watertight bulkheads, which assist in holding the hull to shape. Also, it must not be forgotten that a series of deep longitudinals runs through the bottom of the ship, while the main deck is immensely stiffened by two 12-inch I-beams, worked along the inner edge of the main-deck stringers, and two 18-inch I-beams, which extend through two thirds of the length of the ship on each side of the boiler-room and engine-room hatchways. Enough has been said to show that these vessels are of astonishingly light construction; and the fact that the "Patterson" went through that terrific three days' gale, early in the year, when the Atlantic fleet was on its way to Gauntanamo, Cuba, without the slightest sign of structural weakness, speaks volumes for the excellence of the design and the high character of the workmanship of these very fine boats.

But the flagship has made signal to get under way, and going up on the bridge, we learn what are to be the maneuvers for the day. A fleet of eight battleships is leaving Newport Harbor for the open sea, although the harbor is known to be blocked by a group of nine submarines, which are cruising off the entrance to the harbor, well outside the range of the shore batteries. The battleships are to steam out in column protected by a screen of nineteen destroyers. At present, our destroyer fleet in commission consists of four groups, with five ships in each group; although on this particular day we have but nineteen boats available, the "Warrington" being still at Newport News, having a new stern built on to replace the one that was-cut off by a sailing schooner during a gale of wind last winter.

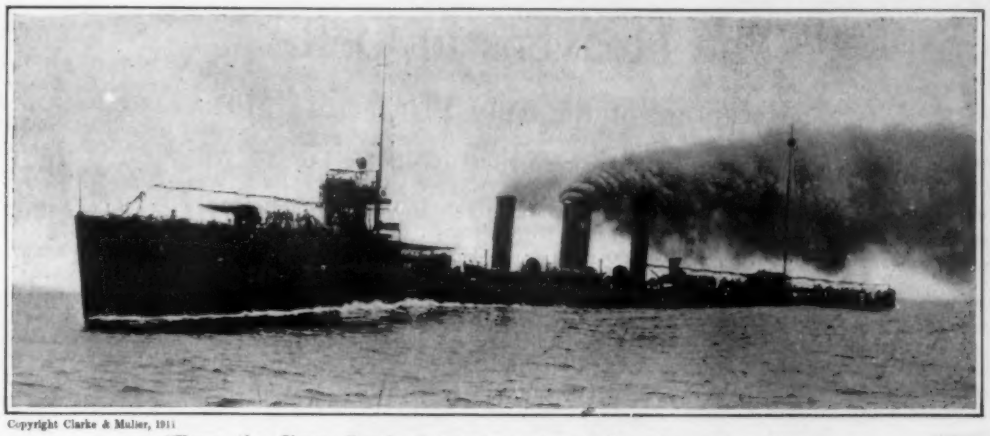
The duty of the destroyers is to form a screen entirely around the fleet, the boats steaming at such distances from one another that the chance of a submarine slipping by without being sighted will be reduced to a minimum.

As we left the harbor, two divisions, or nine boats, forming the van, led the way in wedge-shaped formation, being distant two or three miles ahead of the leading ship of the battleship line. A mile or so to starboard, steaming on a parallel course, in line ahead, was a group of five destroyers. An equal distance to port was our group, steaming also in a parallel column formation, with the flagship "Patterson" in the van. As we reached the mouth of the harbor, the leading groups, being on divergent courses, gradually opened out their distances from one another, until they were spread over a wide reach of the Sound in fan-shaped formation, the boats being at a distance, say, of a mile and a half from each other. The speed of the fleet had been raised to fifteen knots, and as we drew out beyond range of protection by the shore batteries, a keen lookout was kept for the tell-tale periscopes of the submarines, which, seen at a distance, look no larger than a pair of lead pencils.

There was a long and rather heavy swell rolling in from the sea, and as we changed course, taking the sea on the broadside, I saw some of the most extraordinary rolling on the part of the destroyers that it is possible to imagine. The easy bilge and generally fine form of the underwater body of these boats and the disposition of weights are such as to conduce to quick motion and an extreme angle of roll. Even in the moderate sea that was running, the "Patterson" soon commenced to swing from twenty-five to thirty degrees each side of the perpendicular. This, I was informed, was moderate in com-



"Our group went through a series of evolutions which displayed the facility and accuracy with which these craft are handled."



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"From the flimsy 'boat' of twenty to twenty-five years ago, the torpedo craft has developed into the 'ship,' strong, swift, and seagoing."

parison to what these boats are capable of; for in heavy weather, the "Patterson" has rolled as much as forty-five degrees each side of the vertical, or through an arc of ninety degrees in all, and at times has reached seventy degrees. The eyes of the officers on the bridge are at a level of about twenty-five feet above the water line, and the period of roll is about five seconds. One of our officers, with a mathematical turn of mind, figured out for me that the maximum speed with which those on the bridge were swept through the arc described during the excessive rolling of the great January storm was somewhere between twenty and twenty-five miles an hour! Just think of that, ye landsmen, whose experience of the sea is confined to the slow and easy motion of a forty-thousand-ton ocean liner! I had heard, and could now well believe, that a destroyer is one of the most uncomfortable of boats, and that a gale at sea is a heavy strain upon the physical endurance of those on board. The motions are quick, constantly changing, and frequently unexpected. The muscular tension of the body cannot be relaxed for a moment, not even when lying down in a bunk to snatch a badly-needed sleep.

Nevertheless, to the honor of our naval officers let it be known, that there is no service so popular as the torpedo service. Certainly there can be no branch of the service which affords such splendid experience and training for those younger officers who, later, are to become the captains and admirals of our larger ships. The high speed, frequently over thirty knots, the complicated maneuvers, many of them carried out on the darkest nights, without a light showing on any one of the fleet, call for the quick eye, the steady hand, and swift decision, evidence of which I was to see, a day or two later, during the night maneuvers.

But to return to our story. Somewhere in that wide stretch of tumbling sea ahead and on either flank of the far-flung screen of destroyers were the nine submarines—not gathered in any well-defined group, but in all probability scattered so as to make their attack from widely separated points. The bright sun of the morning had disappeared, and sky and sea presented a monotone of dull gray, relieved only by the occasional broken crests of the heavier seas. To the inexperienced eye of the landsman, it seemed as though the detection at a distance of so small an object as a submarine, even if she were running awash with deck and conning tower exposed, would be a matter of pure luck; and when I remembered that the little craft were all of them by this time fifteen feet below the surface, and taking careful note of the position, course and speed of every one of our nineteen scouts, and that they were doing this at the slight risk of showing only the tops of their slender periscopes above water, it seemed as though our task of discovering, and if possible sinking these little fellows was one of insuperable difficulty. But the lookouts are special men, chosen because of their quick eyesight; and the readiness with which they "picked up" the submarines with the naked eye was surprising.

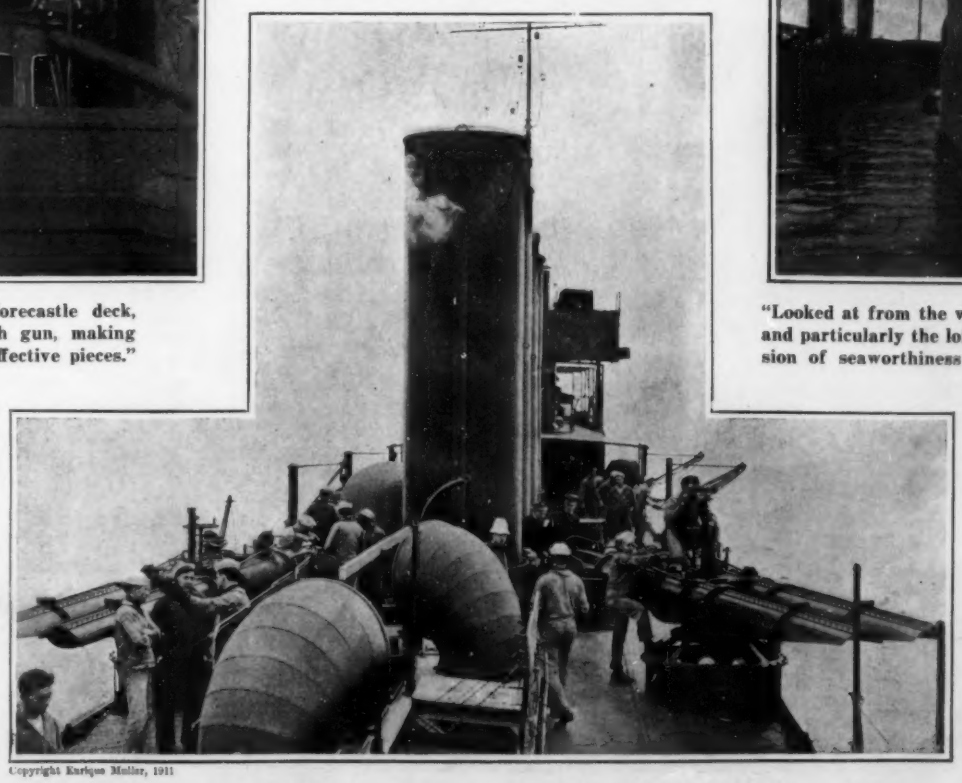
If the submarine could only see through the water, defense by a screen of destroyers would be hopeless; but in making an attack on a moving fleet it is absolutely necessary for the submarine to thrust its periscopic eyes above water occasionally, both to take note of the movements of the enemy and to correct its own course; and I saw enough on that afternoon to be satisfied that a far-flung screen of destroyers is a most efficient protection for a battleship fleet—at least when it is in motion—against this most dreaded of all forms of attack. Just here, it would be well to point the moral that one of the greatest needs of the United States Navy today is an adequate fleet of destroyers. It has come to be accepted among the leading naval powers that for every battleship there should be four destroyers. How far our Navy falls below this mark is shown by the fact that although we possess a total of thirty-seven battleships built, building or authorized, we have at present only thirty-seven destroyers

(Concluded on page 287.)

Bridge from main deck, showing signal flags on right and Ardois electric lamps on left for day and night signalling.

"Forward, on the forecastle deck, is yet another 3-inch gun, making in all five of these effective pieces."

"Looked at from the water, the generous freeboard and particularly the lofty fore deck gave an impression of seaworthiness that was very convincing."



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"Amidships, on the main deck, are two twin 18-inch torpedo tubes, mounted so that they can be swung through a wide arc by a man, who, seated upon the tubes with his eye at a telescopic sight, trains them upon the target by means of a hand-wheel."

The Heavens in October

Recapture of the Tiny Planet 1911 MT.

By Henry Norris Russell, Ph.D.

EASILY first in interest among the astronomical announcements of the past summer is the recapture—if we may so speak—of the very remarkable asteroid known as 1911 *MT*.

The history of this little body has afforded quite an astronomical romance, which nearly turned out, as has been well said, to be an astronomical tragedy.

On October 3d, 1911, Prof. Palisa of Vienna, a distinguished observer of the minor planets, while observing another object, noticed that one of a pair of faint stars in the field of view of his telescope had changed its position relative to the other. A few minutes measures showed which one was moving, and made it clear that an object of unusual interest had been discovered; for the new asteroid was moving rapidly southward and *eastward*.

The little planet was almost in opposition to the Sun; and when in this relative position, practically all the known planets and asteroids seem to move westward. They are all really moving eastward, it is true, around the Sun; but the eastward motion of all previously known planets (except Eros near perihelion) is slower than that of the Earth, so that we leave them behind, and they seem to move toward the west.

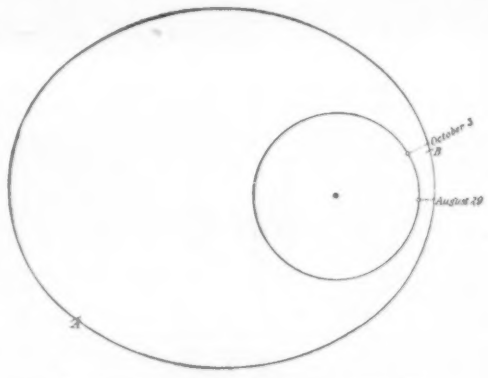
The news of the discovery was spread abroad by telegraph, and on the following night another observation was secured by Palisa, and two by Pechule at Copenhagen, but then bad weather set in; the Moon came along and made the sky too bright to see faint stars; and, after she had gone, the new planet was lost, and could not be recovered, though photographs of the region in which it might be expected to be, were taken with powerful instruments.

So the situation remained for several months. The existing observations of the asteroid were confined to two days, and did not afford enough material for the computation of a reliable orbit by the ordinary methods. However, an attack on the problem was made by Mr. Haynes of the University of California, using certain very powerful methods of calculation developed by Prof. Leuschner of that university, and he succeeded in getting an approximate orbit, which was published last April. From this an approximate ephemeris of the planet's tract was calculated, and, when this was available, images of the planet were found on three plates taken at Greenwich on October 11th, and on one obtained at Heidelberg on October 17th. These images were faint, and had previously been overlooked, but were found when it was known approximately where to search for them.

With the aid of these observations, Mr. Haynes has computed a second and much more accurate orbit, and an improved search ephemeris. Thanks to this, the planet has been identified on a plate taken at Heidelberg in the middle of September, and one exposed at Johannesburg on October 18th. With this interval of a month between our extreme observations, a good orbit can be obtained; and it is possible that still more observations may turn up, for the planet was well placed in the northern sky, and fully as bright as at discovery, all through August and September, and more images may be found on plates exposed for other purposes to the proper region of the sky.

The orbit of this remarkable member of our solar system is shown in the accompanying illustration. It is remarkable for its great eccentricity, which exceeds that of any previously known planet. When nearest to the Sun, it is but 110,000,000 miles from him, and about 19,000,000 from the Earth's orbit, while its greatest distance from the Sun is 366,000,000 miles, and its distance from the Earth may reach 459,000,000.

The orbit is inclined nearly 11 degrees to the plane



Orbits of the Earth and Planet 1911 MT.

of the ecliptic, crossing it at the points marked *A* and *B* in the figure, so that when nearest the Sun it is north of the Earth's orbital plane, and a little farther from our track than the diagram would indicate.

At the time of discovery it had just passed as near the Earth as it could possibly come—as the figure shows, by giving the positions of the two bodies on October 3d, 1911 (the discovery date) and on August 29th, when the planet was nearest the Sun. The planet's motion in this part of its orbit is actually faster than the Earth's motion, which accounts for its apparent eastward motion in the sky. As the two swung farther around their paths they rapidly separated, which caused a steady decline in the apparent brightness of the planet, which explains why it was so nearly lost.

This little planet must be one of the very smallest bodies so far known to astronomical observation. When discovered, at a distance of only 23,000,000 miles from us, it appeared to be of the twelfth magnitude, in spite of the very favorable conditions. If in opposition, at its average distance from the Sun, it would be more than one hundred times fainter, and of magnitude 17.5, hardly visible with the great Yerkes telescope, and just accessible photographically with the most powerful instruments, if its apparent motion were not so rapid. When remotest from the Sun, its magnitude, even if the Earth was most favorably placed, would be 19.8—so faint that, even if fixed in the heavens, it could be photographed only with the great Mount Wilson reflector; and, considering its motion, would be beyond even its powers.

It can probably be observed only when in the nearest third of its orbit to the Sun, and then only when the Earth happens to be on the same side of the Sun as the planet. According to Mr. Haynes' calculations, it should return to its perihelion in October, 1915; but observations covering only two weeks give but a slender basis for prediction of a planet's place four years ahead, and it may be necessary to keep a sharp lookout (photographically) on the planet's track for months around this date.

The actual diameter of the new planet can only be estimated by comparing the amount of light which it reflects with that which we would receive from Mars or Mercury at the same distance; and in this way it may be estimated that it is only three or four miles in diameter, a mere speck compared with the extent of interplanetary space.

The curious name of this little body deserves explanation. When the discoveries of asteroids became numerous, fifteen years or so ago, they were provisionally denoted by letters, *A*, *B*, *C*, etc., the assignment of names and of permanent numbers being reserved until reliable orbits could be calculated. The alphabet was soon exhausted; then pairs of letters were used—*AA*, *AB*, to *AZ*, *BA*, *BB*, etc. Two or three years ago this arrangement ran out; and then it was decided to begin again with *AA*, but to prefix the date of discovery. Hence, the present planet is called 1911 *MT* to distinguish it from one with similar letters in the earlier sequence, discovered some years ago. It will probably not be long before it receives a permanent number and a name.

The principal astronomical event of the coming month will be the total eclipse of the Sun on October 10th, which is visible in a small part of the southeastern United States as a partial eclipse just after sunrise. The track of total obscuration begins in the Pacific, off the coast of Nicaragua, crosses South America from one point in Ecuador a little north of Quito to one in Brazil a little south and west of Rio de Janeiro, after which the whole course is lost in the South Atlantic. The greatest observable duration of totality is about 1 minute 50 seconds, on the Brazilian coast. It is to be hoped that weather conditions may favor the observers of this eclipse better than they did last year in the Tonga Islands, when clouds almost completely

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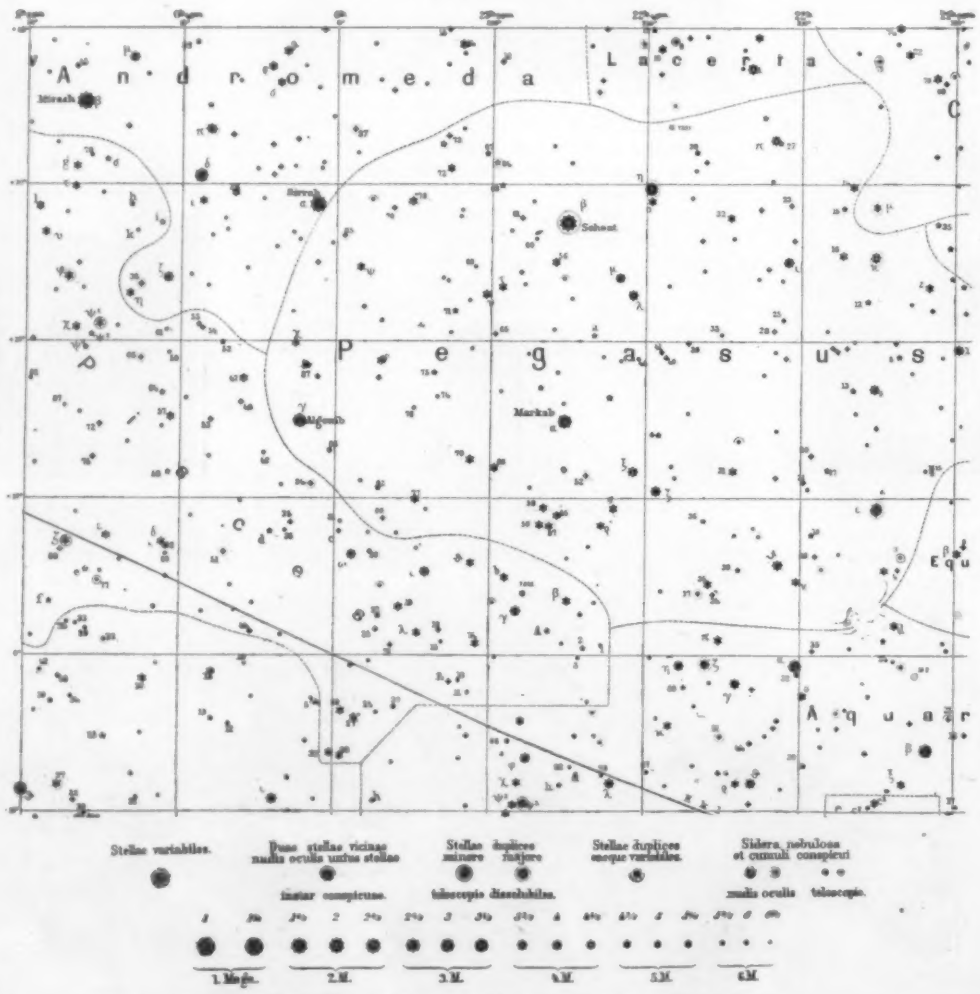
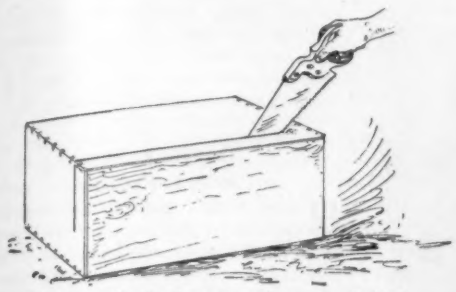


THE HEAVENS IN THE REGION OF PEGASUS AND PISCES

Making a Tool Chest

By B. F. Albert

IF you desire a chest or box with a trunk or recess cover, you can make the best job by putting your box together and fastening up the sides and ends, top and bottom, by dovetailing or otherwise. With a gage you make a line parallel to the top edge and far enough



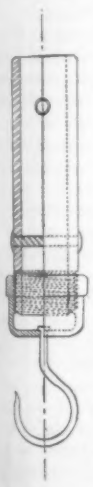
Simple method of constructing a tool chest.

down the sides to provide a lid or cover of desired depth. The box is then sawed along this line with a rip-saw. This will cut fairly smooth, and a very slight finish along the sawed edge is sufficient to complete the work. If your saw cuts smoothly, merely sandpapering will do in some cases, and you will find the cover to be a nice fit.

Rope-end Hook

By Freeman Weiss

IN making a porch swing recently, the writer had occasion to find a suitable method of attaching the ropes to eyes in the ceiling, something a little neater than the customary bulky knot or loop, and yet able to stand considerable strain. The market provides a "rope-end clip," which is, however, made no larger than ¾ inch in diameter. As in the writer's case, where a larger rope must be used, the following will be found entirely secure, and of very neat appearance:



Rope-end hook.

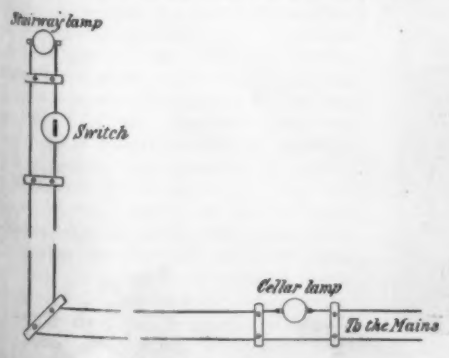
A piece of 1-inch iron pipe (larger or smaller according to the size of the rope) about 5 inches long is cut off and threaded on one end. Two ¼-inch holes are drilled on diameters of this piece, at right angles to each other and about an inch from the ends. For these, two pins are made, long enough to reach through the pipe and allow for riveting over at each end. A standard pipe cap to match the pipe is then drilled through the center to a trifle larger size than the shank of the screw hook or eye, permitting it when in place to turn freely. The hook or eye, as the case may require, is then cut off just above the threaded portion, and is fastened into the cap by riveting over the shank. The cap may be screwed on and the rope inserted in the pipe and fastened there by means of the two pins, which are then riveted over. The accompanying illustration, showing a partial section of the completed hook, will make the construction clear. A valuable feature of this device is the swiveled hook, which prevents twisting of the rope. This hook has been tested to over five hundred pounds pull and found quite secure.

Improved Arrangement of Cellar Lamp

By Thomas T. McNish, M.D.

THE ingenious automatic cellar switch described by Mr. J. E. Hanning in the SCIENTIFIC AMERICAN of April 13th, leaves little to be desired. Some readers, however, may find it difficult to install such a device, and to such a plan adopted by the writer years before the "pull socket" was put upon the market, may be of service.

In the writer's home, as in many others, the cellar-way leads from the kitchen down to a landing, and then behind a partition which shuts off all light from the cellar. At the head of the stairway is a lamp, and below it a switch, which formerly was used only to throw in the furnace cellar lamp, the upper one being turned on or off independently. With this arrangement, the cellar lamp was frequently left burning, and that suggested the simple expedient of joining the two lamps in the same circuit. As this circuit carries 105 volts, each lamp is 52 volts. This combination, which is shown in the accompanying sketch, has been entirely satisfactory, as the light from the upper lamp cannot be overlooked.



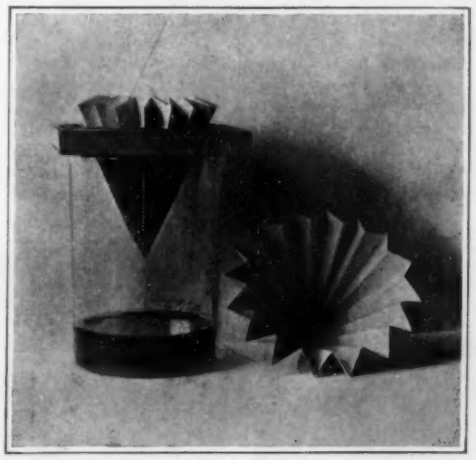
Circuit of the cellar lamp.

Home-made Oil Filters

By Frederick E. Ward

IN the home workshop, and especially where there is an automobile to be taken care of, much valuable lubricating oil has to be thrown away when it becomes too dirty or gummy for further use, and yet the quantity is not sufficient to warrant the purchase of an oil filter. Practically all of this wasted oil could be saved and made as good as new by the use of an inexpensive home-made filter, such as is shown in the accompanying photograph.

A 6 by 8-inch glass battery jar, or other suitable vessel, is provided with a wooden cover having a large circular opening in the middle. Into this opening is fitted a cone made of wire gauze or mosquito netting, held in place by a few carpet tacks. When placed over the jar, this serves as a support for the paper filter cone, one of which is shown lying on the table, and which, for ordinary grades of machine oil, is best made up of two thicknesses of ordinary light brown Manila wrapping paper, folded carefully so as to avoid tearing. After the dirty oil is placed in the paper cone,



A home-made oil filter.

it takes some little time for the filtered oil to begin to drip through, but it will be found that if the apparatus is left to itself for a few days, a surprising amount of clear, pure oil will accumulate in the glass jar. By the use of paper of a suitable texture, even the hopelessly black and gritty oil wrung out from the waste with which engine drip pans are mopped up, may thus be purified for further usefulness.

Workshop Notes

How to Make an Old File Cut Like New.—When a file has seen its best days and refuses to cut, try this little kink: Take a piece of charcoal and rub on the file, just one or two strokes, and then try your file. You will find that it cuts much better, and will not clog with filings.—H. D. C.

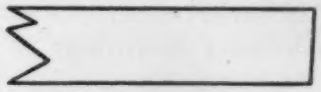
Making Small Taps.—One of the small but irritating accidents to which a mechanic is often subject is the breaking of small taps. In a large machine shop duplicates are generally at hand, but the home mechanic is not always so fortunate. A temporary and fairly efficient substitute, however, may be made from an ordinary fluted drill of the proper size. The drill should first be annealed, then tapered with a file, threaded with a die of the desired size, and finally restored to its original temper.—STUART R. WARD.

Converting Centigrade into Fahrenheit

IN the SCIENTIFIC AMERICAN of September 14th we published an article entitled "How to Correct a Thermometer." In this article formulas were given for converting Centigrade to Fahrenheit and Fahrenheit to Centigrade. The former formula was incorrectly stated. It should have been $F = \frac{9}{5} C + 32$.

Guideline Creaser

SEVERAL suggestions have been published in these columns for making guidelines for lettering drawings. In the writer's opinion it is not necessary actually to draw the line. Instead, the tool illustrated herewith may be used. Cut it out of sheet brass, copper,

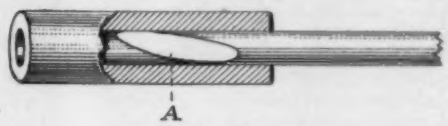


Guideline creaser.

or tin to the shape indicated, the distance between the points being the distance wanted between the lines. With this tool the drawing is merely creased or faintly pressed, so that after the letters have been made there are no lines to be erased.—B. F. DASHIELL.

A Simple Reamer

THIS reamer is made by taking a perfectly round piece of steel and beveling the end as shown, making as sharp a corner as possible, marked *A*. It can be



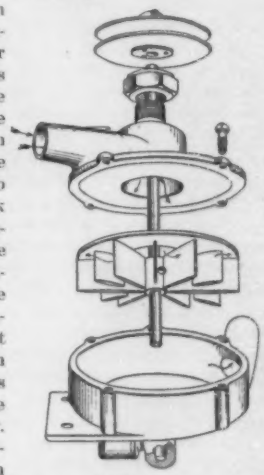
Simple form of reamer.

backed off a little on the round side, starting a little from the edge marked *A*. Then it may be tempered in the usual manner.—A. F. B.

Circulating Pump for Gasoline Engines

By A. F. Bishop

THE pump shown in the accompanying engraving is adapted for use on gasoline engines either of the automobile type or of the marine type. The construction shown represents the work of an amateur who has fortunately struck upon a very efficient design. The pump is of the centrifugal type, as indicated by the arrow. The shaft is ⅜ inch in diameter and the bucket wheel 3¼ inches in diameter. The shell is bored out to allow the wheel to revolve freely. The design of the machine is clearly shown in the illustration, and the parts are drawn in proper proportion, so that it should be a simple matter for others to copy the construction.



Home-made circulating pump.

Electric Speed Indicator

By B. F. Dashiell

A SIMPLE speed indicator may be made by anyone as follows: On a suitable base mount two gear wheels, *B* and *D*. The wheel *B* should have 100 teeth, and *D* should have 110. The latter should mesh with a pinion *C* having ten teeth and soldered to the wheel *B*. On the periphery of wheel *D* solder a pin to form a contact point adapted to engage a spring contact at each complete turn of the wheel. In this way an electric circuit is closed through a sounder and battery arranged as indicated in the diagram. In use, a small pinion *A*, provided with ten teeth, should be fitted on the shaft whose speed is to be determined. The instrument is then brought close to the shaft, so that the pinion *A* will mesh with the gear wheel *B*. The speed of the shaft in revolutions per minute may then be determined by counting the number of clicks in the sounder and multiplying by $\frac{B}{A} \times \frac{D}{C}$ or 110; for pinion *A* will have to turn ten times before the gear wheel *B* will make one complete revolution, and the gear wheel *B* with its pinion *C* will have to turn eleven times while the gear *D* is making one complete revolution.

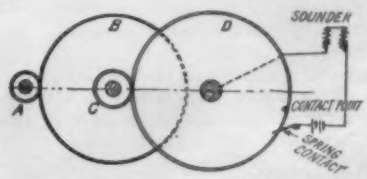


Diagram of the speed indicator.

Inventions New and Interesting

Simple Patent Law; Patent Office News; Notes on Trademarks

A Self-contained Diving Outfit

By Our Berlin Correspondent

THE diving outfit designed by Messrs. Drägerwerk of Lübeck, Germany, makes the diver independent of atmospheric air, by supplying him with oxygen and regenerating the air he expires. The outfit comprises an apparatus worn like a knapsack where the air circulating in the helmet and the diving suit is purified automatically of the deleterious gases produced by breathing and regenerated by an addition of oxygen. The diver thus has at his disposal 60 to 70 liters of air per minute, i. e., 3,600 to 4,200 liters per hour, which suffices for even the most exacting work.

The regenerating apparatus comprises steel cylinders filled with compressed oxygen, a potash cartridge and circulating arrangement, viz., a suction and pressure nozzle and a pressure reduction valve. It is connected with the helmet by two short lengths of hose, one of which serves to draw off any used-up air, while the other supplies fresh air.

The apparatus is started up by opening a valve which is very easily handled; it will work from 2 to 3 hours, in accordance with the personal skill of the diver and with the quantity of carbonic acid secreted by his lungs.

In the place of the usual lead ballast, the diver carries on his chest a weight constituted by steel bottles where compressed air or highly compressed oxygen is accumulated. Whenever the diver wishes to reach the surface without any outside help, he simply opens the valve of these bottles, thus causing air to flow into his outfit and to impart to the latter the required buoyancy. This is how in cases of emergency he will from any normal depth reach, in a few moments, the surface of the water. A safety valve actuated with any excess pressure prevents the diving outfit from bursting with any accidental rise from considerable depths. If on the other hand the diver happened to fall even to a small depth, his life would be seriously endangered unless some special safety device were provided. In fact, any sudden increase in pressure would throw the diver's body into the helmet, like the piston of an engine, while the congestion produced at the same time might cause the man to swoon, so as to be unable to prevent a catastrophe. In order to obviate this danger, the helmet of the new diving outfit has been made of a subtle and substantial India rubber fabric, protected by a metal cover against any mechanical injury. Should the diver happen to fall, the pressure of the water would compress not only the air in the outfit, but the air in the helmet, the India rubber fabric of which will yield in the same way as that of the outfit. While the diver thus would feel the sudden increase in pressure, he would experience it uniformly on all sides, which would first of all prevent congestion. He will thus be able, with full consciousness, to allow some air to enter his outfit from the ballast on his chest, thus re-establishing normal conditions at a moment's notice. A safely acting telephone, which on account of the feeble noise of the air circulating in the apparatus insures a very satisfactory connection, can be attached to the helmet. The telephone cable and signaling string can be combined in a safety cable for hauling the diver to the surface in cases of emergency.

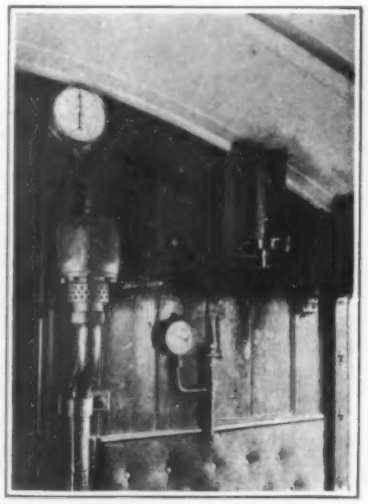
The type of apparatus so far designed is destined for depths of 20 meters as a maximum. Apparatus allowing the diver to work at greater depths are in course of preparation.

The carbonic acid expired by the diver is absorbed in the potash cartridge attached to the knapsack apparatus where the air passes in succession some flat cups lined with numerous grains of potash and soda which absorb any trace of carbonic acid. The air thus freed from any deleterious gases produced by breathing reaches the suction and pressure valve, in order there to be regenerated with a supply of 2 liters of oxygen per minute. The air conduit supplying the fresh air to the mouth and nose of the diver, closes the cycle performed by air circulation. The diving outfit acts, both as a breathing bag and an air reservoir in critical moments.

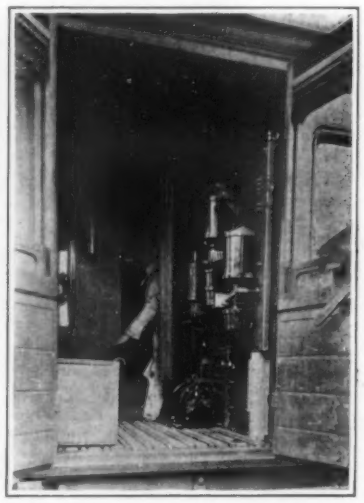
A special feature of this apparatus is its allowing the diver to work for hours below the surface without any connection with the land or ship, whenever the safety string has been cut or the telephone connection interrupted. Any pumps and the men required for their operation are dispensed with, the diver carrying about with him the air supply required for his breathing. Moreover, there is no risk of the diving outfit becoming twisted with the air conduit; and the cost of operation is extremely low.

Diver coming to the surface of his own accord.

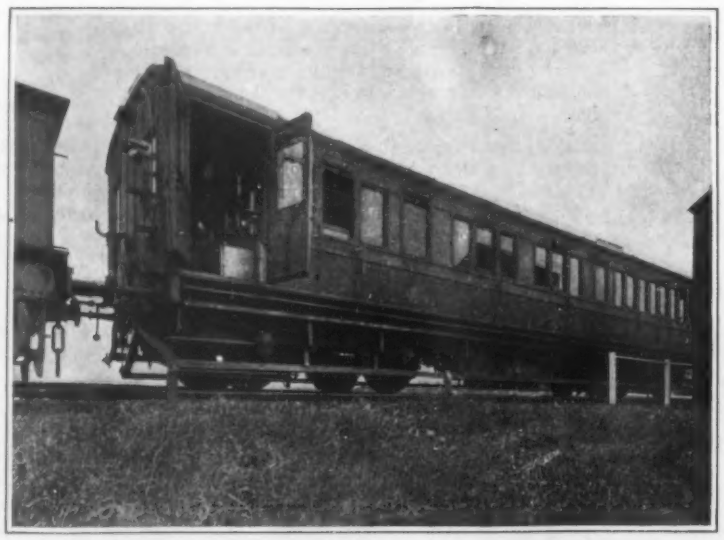
A self-contained diving apparatus ready for use.



Solenoid controlling the brakes.



Telephoning from a moving train.



Guard's compartment containing the railophone apparatus.

The Railophone

By P. F. Mottelay

HANS VON KRAMER, an electrical engineer of Birmingham, has invented a system of wireless railway, telegraphy, telephony and train signalling, of which several successful public demonstrations have been made. The apparatus is called "The Railophone," and operates by electro-magnetic induction between coils placed on the train and a copper wire or cable supported on short posts or, preferably, buried under ground, parallel with and outside of the track.

For use in telephoning between the station and the moving train the train equipment comprises a telephone transmitter and a pair of head telephones placed in a sound-proof box in the guard's compartment of a coach. These instruments are electrically connected with two large coils of copper wire wound on frames called "Railophone Frames," which are suspended from the coach by iron brackets. The upper frame is suitably wound for sending and the lower for receiving.

The telephonic currents produced by the voice create a fluctuating magnetic field which emanating from the upper frame, induces an electric current of corresponding period in the underground wire, which is connected to telephones at stations and, if desired, may be connected with the general telephone and telegraph system. There is no mechanical contact between the buried wire and the moving train. Conversely, telephonic currents sent through the buried wire from instruments at stations induce corresponding currents in the lower railophone coils, which are connected with the receiving instrument on the train.

In the original system there were no means of "calling up" and the operator, like a wireless operator aboard ship, had to be in constant attendance. This defect has been remedied by the addition of a very sensitive detector, which picks up the exceedingly feeble electrical impulses received on the train by induction and "relays" them into currents strong enough to ring a bell or sound a horn.

For telegraphing it is merely necessary to connect the wires by suitable switches with the telegraphic instruments, instead of the telephones. With the telegraphic instruments signals can be transmitted by the Morse key and code.

For railway signalling the resonating relay or detector already mentioned is employed. This instrument, the invention of Dr. Kapp and Mr. von Kramer, possesses several unique features, including its extreme sensitiveness and facility of tuning to different frequencies. It has no movable parts, requires no adjustments whatever, is unaffected by mechanical vibrations of frequencies differing from its own and is of very simple construction. It is so sensitive that it can be operated by 1/8 volt and 1/4,000 ampere. It consists of a magnetic system acting on a tuned steel reed, one end of which is rigidly attached to one pole of a powerful permanent magnet, while the other end is free to vibrate between the two parts into which the other pole is divided. The feeble alternating current which is received by induction passes through two coils which act together upon the free end of the reed. When the frequency of these currents corresponds with the natural period of the reed, the latter is set into vibration

and is caused to open or close a local circuit. With this relay, which is unaffected by outside disturbances, whether electrical or mechanical, such as vibrations due to vehicles, it is possible to ring bells, sound steam whistles or automobile horns, operate locomotive valves, signal levers, interlocking gear, vacuum brakes and signal lamps. The detector has even been successfully adapted for automatic stopping of trains.

Each section of track between two consecutive signal stations is divided into three distinct parts: The Main Section, from 1 mile to 10 miles or more in length; the Restoring Section, and the Clearing Section, each about 100 yards long.

The following results have been obtained with the apparatus: When a train enters the Main Section, a red lamp is lit in the signal station. This lamp is placed over the signal controlling the semaphore. The red lamp remains lighted until the train has passed through the Main Section and the Restoring Section beyond. Simultaneously with the lighting of the lamp, a bell, or buzzer, is sounded, as an additional warning to the signalman to protect the section by displaying the danger signal. If he does not obey the warning within ten seconds, the signal lever is automatically operated, and its movement is recorded. The signal lever, whether moved automatically or by the operator, remains electrically locked in the danger position until the train has left the section. If the lever is operated automatically an alarm gong outside the signal box is sounded and the time of the occurrence is automatically recorded, so that a strict control is kept over the signalman. When the train enters the Clearing Section, the red lamp is automatically extinguished and a green lamp is lit. When the train leaves the Clearing Section, the green lamp is extinguished and the signal lever is unlocked. After the train has sent out signals indicating its entrance into the Main Section, it is enabled to receive signals or instructions by telephone or telegraph. It can be brought to a standstill by the signalman at will, or the conductor can place himself in communication with the signal section.

If a second train ignores the danger signal and enters the section, both trains are automatically stopped. Should a second train enter the section in the opposite direction, the same result ensues, so that head-on collisions are impossible. When the train has left the Clearing Section, the instruments at the station are restored to their normal condition, but should the train be prevented from entering the succeeding Main Section, the green lamp continues to glow, and the alarm gong to sound. For signaling in foggy weather a special fog signaling attachment is added to the train equipment by which the train is automatically stopped in each Clearing Section.

The essential features of the Railophone may be summed up as follows: The transmission of signals is effected by induction from wires which are safeguarded from accident by being placed underground, and thus a reliable connecting link between stations and trains is established throughout the whole journey. The signals are unidirectional and cannot stray to other trains, as may occur with ordinary wireless signals. The system requires no sliding brushes, contact bars or switches, bonded rail joints, or any obstruction of the track, and it is not influenced by atmospheric disturbances or climatic conditions. The cost of maintenance of the underground circuit is trifling and the initial cost per train mile is exceedingly small.

The system comprises five principal groups of apparatus: First, the stationary underground conductors; second, the movable circuits carried by one coach of each train; third, the tunable detector employed as a relay; fourth, the alternating current apparatus, telegraph and telephone instruments; fifth, the solenoids which automatically operate the alarm signals and controlling gear.

The adoption of the system does not entail any essential change in regulations. In ordinary conditions the operator at the signal station has no additional apparatus to attend to, but is merely required to observe the audible and visible signals. As the engine does not carry any railophone apparatus the attention of the driver is not diverted from his engine. All the apparatus on the train is mounted on one coach, and trains can be made up and engines coupled in the ordinary way. Instead of encouraging carelessness of the drivers and signalmen, as an entirely automatic system of controlling trains might do, the railophone system increases their alertness by automatically recording any inattention. By this means it is probable that a large proportion of the very numerous slight accidents which are just prevented from becoming serious will be avoided.

In a recent demonstration of the apparatus messages were sent from a moving train to a station and from the station to the train, the moving train was warned by audible signals, stopped automatically, and also by the station operator, and was prevented from entering a block until the brake had been released by the operator at the signal station.

Notes for Inventors

Making Paper from Redwood Bark.—The bark of the California redwood tree, which has heretofore been practically a waste product of the many large lumber mills of the State, is likely to be used to a large extent in the manufacture of paper. Heretofore redwood lumber mills have been unable to dispose of the bark to paper manufacturers for the reason that there seems to be no way of removing the red color. Recently, however, a process has been discovered by which the color can be removed or changed, so that white paper may be made of the redwood bark. A company has been organized to manufacture paper from the redwood bark and is purchasing the waste material from the big mills in the forest regions of Mendocino County, California.

Dentists as Inventors.—You are pretty sure to find an inventor if you scratch a dentist, for, under the skin, practically all of the profession exercise the creative art. This is not to be wondered at because of the intelligence of the dental doctors and the fact that operative and mechanical dentistry both call for a high degree of mechanical ability; the combination of intelligence and mechanical ability and their exercise being sure to result in invention. That many inventors are found among the dentists accounts, in part at least, for the high development of the science especially in this country. Considering all of this, it is strange that no one has yet, so we are told, provided a plastic filling that will permanently resist the action of the fluids of the mouth. Such a filling would probably mark the greatest advance made for years in the dental art.

Life-saving Appliances.—The Board appointed by the War Department with Lieut.-Col. Chauncey B. Baker, Deputy Quartermaster-General U. S. Army, as its president, to consider the question of installing additional and suitable life-saving equipment on army transports in compliance with Act of Congress approved June 14th, 1912, has arranged for a meeting of the Board to be held at Newport News, Va., about the week commencing October 7th, 1912, the exact date of which meeting can be ascertained later by addressing Geo. A. Anthony, secretary of the Board, office of the Quartermaster-General, Washington, D. C.. It is the purpose of the Board to consider at this meeting any life-saving apparatus, including lifeboats, launches, rafts or other devices, launching apparatus, or whatever gear or appliance that may be necessary for the efficient handling and operation of the same; and those interested are invited to be present at that time prepared to demonstrate the utility and efficacy of any device they may have to present.

RECENTLY PATENTED INVENTIONS.

These columns are open to all patentees. The notices are inserted by special arrangement with the inventors. Terms on application to the Advertising Department of the SCIENTIFIC AMERICAN.

Pertaining to Apparel.

HAT FASTENER.—H. DIPPEL, 611 Texas St., San Francisco, Cal. The inventor's object is the provision of a simple, economical, and easily operated device for securing a hat in place on the head of the wearer, which will hold the hat securely in place, while permitting its easy removal when desired.

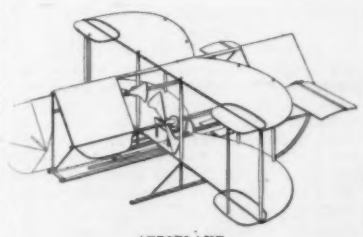
BANDEAU AND HAT FASTENER.—CORINNE E. THORNTON and MARIE THORNTON, care of Dr. J. Thornton, 606 Exchange Bldg., Los Angeles, Cal. The object of this improvement is to provide a simple and cheaply constructed device especially designed for holding ladies' hats in place, without injury to the hat or to the wearer, or to others, which may be easily applied or removed.

Pertaining to Aviation.

AEROPLANE.—S. S. YARRINGTON, 2510 W. 18th St., Wilmington, Del. An object here is to provide a pair of operating levers, each pair of said levers having double functions, thereby reducing the necessary number of operating levers. The hydroplanes are provided with means connected with a lever for lowering and raising the same. The invention provides a form of elevating plane and means for manipulation; also a form of rudder with means for supporting the same and operating it.

FLYING MACHINE.—F. L. SCHAUFLER, care of Natl. Aerial Navigation & Equipment Co., Mattoon, Ill. A purpose here is to provide an aeroplane with a plurality of superposed planes offset relative to each other so as to offer a more stable and better supported machine. Another is to provide a balancing member having one or more planes whereby the supporting surface of the machine, as a whole, may be controlled with an elevating plane for controlling the vertical movement of the machine.

AEROPLANE.—J. A. BABBITT, 70 C. Yamashita, 6 No. Yokohama, Japan. This invention varies most widely from the form of construction in the present state of the aviation art in the following distinctive features: In the construction of the planes; in the employment of balancing members actuated by shifting the aviator's body; the operation of the steering rudder by means of the feet,



AEROPLANE.

and the mechanical means whereby this is accomplished; the manipulation of levitating and balancing planes and the simplified mechanism whereby the same is accomplished; and the construction and employment of self-contained earth traction driving wheels which may be discontinued immediately the aeroplane is lifted from the ground. The machine is herewith shown in a perspective view.

Of Interest to Farmers.

EXHAUST FAN.—S. REMBERT, 1133 Poplar St., Memphis, Tenn. This improvement is particularly in that class of exhaust fans illustrated in a former patent granted to Mr. Rembert, the present invention seeking to provide a construction by which the seed cotton or similar material handled by the fan may be discharged separately from the dust-laden air drawn in by the fan, thus enabling the discharge of the seed cotton and dust-laden air at different points and separately.

PLANTER ATTACHMENT FOR CULTIVATORS.—J. P. BRADFORD, R. F. D. No. 2, Jasper, Mo. The intention here is to provide an attachment for connecting the grain or seed box of the planter with the anxle, to permit of a variety of adjustments of the box with respect to the planter, which may be applied to existing planters with but slight changes.

STONE CATCHER FOR FLUMES.—H. R. VAN ETCK, 179 E. 8th St., Holland, Mich. The invention refers particularly to flumes for conveying sugar beets to the mill. An object is to provide a means for catching the stones or other foreign matter, and to so arrange the device that the stones, etc., may be cleaned from the flume without interfering with the flow of the beets for any material period.

Of General Interest.

BUILDING LIGHT AND VENTILATOR.—P. SCHWICKART, 118 Broadway, N. Y., N. Y. This invention relates to skylight and similar building lights, and its object is to provide a light and ventilator, arranged to insure a proper illumination of the space below by the use of reflected rays of light, and to provide a thorough ventilation of the said space.

COLLAPSIBLE BARREL.—J. W. SUTHERLAND, 48 Dorchester St., Sydney, Nova Scotia, Canada. By means of this invention a number of barrel staves can be adjustably secured together, side by side, by means of flexible hoops, together with an arrangement for uniting the ends of said hoops and fastening the ends to hold the barrel staves with their longitudinal edges in contact, so as to form the body of the barrel and hold firmly in place the heads of the barrel at opposite ends of said staves, when the barrel is to be made ready for use.

STUD FOR USE IN BUILDING CONSTRUCTION.—D. DOWD, 402½ E. 5th St., Los Angeles, Cal. This inventor's purpose is to provide a stud which can be readily stamped and worked out of thin metal to special forms and shapes, which is light in weight and provided with simple means whereby lath or other suitable material may be easily attached to the same.

Hardware and Tools.

WINDOW LOCK.—G. B. ROBERTS, 170 E. 77th St., Manhattan, N. Y., N. Y., and M. T. FLANAGAN, North Tarrytown, N. Y. This invention pertains to windows having up and down sliding sashes, and provides a mechanism by which the sashes may be readily and securely locked by a single operation. For this purpose use is made of a locking device on a window frame, and having transverse bolts adapted to register with keepers in the sash stiles at the time when the latter are properly positioned to receive said bolts.

BURR FOR DRESSING GRINDING STONES.—T. E. WARREN, care of Ticonderoga Mach. Wks., Ticonderoga, N. Y. This invention relates to means for burring wood pulp grinders, and provides a burr for dressing, roughing or, as usually termed in mill practice, sharpening or burring grinding stones, and arranged to provide a clearance for the dust or small particles removed from the peripheral face of the grinding stone, and to render the teeth of the burr strong and durable.

UNIVERSAL CLUTCH.—J. CARL, 65 High St., College Point, L. I., N. Y. This invention comprehends a clutch having a body portion and a number of swinging bails or jaws removable relatively to one another, and so formed as to grip the article to be supported, the weight of the article aiding materially in the gripping action.

Heating and Lighting.

SAFETY GAS VALVE.—H. R. COX, 91 Center St., New York, N. Y., and W. SCHMIDT, New York, N. Y. More particularly this invention comprehends a self-closing valve containing a valve seat and a valve member movable against the seat, together with means for exerting leverage upon the valve member as the same is pressed against its seat.

FILTER.—C. B. HOUSER, Jr., 700 State St., E. St. Louis, Mo. The inventor's principal purpose is to provide a hot air filter which may be applied to a register, the application and use of the filter not necessitating the removal of the register or any change in the construction thereof, the device being particularly adapted to be positioned on top of the register.

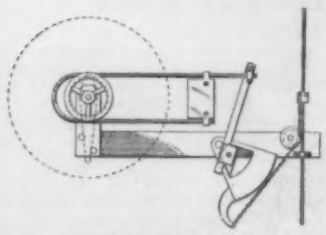
GAS AND SMOKE CONSUMER.—J. HARMON, 308 Superior St., Duluth, Minn. This invention is embodied in a drum or cylinder attached to the side of a furnace above the grate and provided with a pivoted damper for controlling the draft and with a partition or false bottom which is spaced from the true bottom of the drum to form a passageway for admission of air through the apertured front end of the partition.

Household Utilities.

FOLDING BED.—L. B. JEFFCOTT, 250 W. 15th St., Manhattan, N. Y., N. Y. For the purpose of this invention, the mattress frame is made in sections, of which the head and foot sections are U-shaped and the middle or intermediate section is formed of side bars pivotally connected with the side bars of the head and foot sections, and pivotal connections are provided between these sections and the head and foot of the bed.

Machines and Mechanical Devices.

ELEVATOR INDICATOR.—F. A. BOEDTCHER, Bergenfield, N. J. In carrying out the objects of this invention, a side view of which



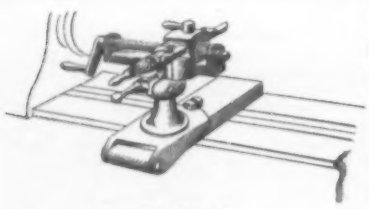
ELEVATOR INDICATOR.

is pictured in the accompanying engraving, an indicator is provided which is formed with the usual pointer and the usual supporting

axle therefor. Rigidly connected with this axle is a grooved wheel designed to carry a substantially U-shaped bar arranged to be driven back and forth over a pulley, whereby the pulley is rotated. This reciprocating bar is connected with a pivotally mounted lever which in turn is connected by a suitable cable to the usual indicator rod or cable.

TANNING DRUM.—C. HASS, Strassburg, Alsace-Lorraine, Germany. This invention refers to revoluble drums provided with trunnions on the drum heads. The object is to provide a tanning drum arranged to relieve the heads of the drum of all undue strain and to transfer the strain directly from the rim of the drum to the trunnions.

SLIDE REST.—G. R. KACSMARIK, 533 E. 82nd St., Manhattan, N. Y., N. Y. For the purposes of this invention use is made of a spindle mounted to turn in the tool post and provided with a horizontally-disposed guideway on which is mounted to slide a head for carrying the tool, the said head being engaged



SLIDE REST.

by a screw rod journaled on the guideway. Use is made of a tool-adjusting screw rod screwing in the head and arranged parallel to the tool, the said tool-adjusting screw rod being provided with a collar engaging a recess in the tool for shifting the last in the direction of its length on screwing the said tool-adjusting screw rod inward or outward in the head. The engraving shows a perspective view of the slide rest in position on a lathe used by jewelers and other persons.

MACHINE FOR PICKING PIN FEATHERS FROM FOWLS.—C. W. SMITH, care of Swift & Co., Stockyards Station, Fort Worth, Texas. This improvement has reference to devices for picking pin feathers from fowls, more particularly for picking pin feather from poultry. The pin feather may be removed in much less time than in the ordinary manual operation, and without injury to the fowl.

TAMPING MACHINE.—O. NOLAN, 1492 Sherburn Ave., St. Paul, Minn. The object of this invention is to provide a machine for tamping quickly and firmly concrete into molds, wherein a plurality of tamping devices or stamps is made use of, operating in succession by manual means or by power and having means for holding the stamps in inoperative position.

FLY AND MOSQUITO DESTROYER.—J. T. PLUMER, Salt Lick, Ky. The principal object which the present invention has in view is the provision of a mechanical device to rapidly rotate invisible whip-like members across a passage to strike and so destroy flies, mosquitoes or other winged insects when in flight.

WHEEL RIM JOINTING MACHINE.—G. A. ENSIGN, care of Defiance Mach. Works, Defiance, Ohio. The invention provides a machine designed for jointing or truing one side of the wheel rim stock to render the said side true with the inner surface of the stock so that any inequalities due to bending or shrinkage are compensated for and the stock is provided with a true working surface to permit of subsequently feeding the stock correctly through a planer to insure the perfect formation of perfect wheel rims.

WEAVE.—J. C. GAYNOR, 465 E. 31st St., Paterson, N. J. This invention pertains particularly to weaves designed to permit sections of the cloth woven to be cut without presenting an edge which will ravel. The object is to provide a weave arranged at any angle across a given piece of cloth, which will permit the cloth to be cut without presenting a raveled edge.

TENSION DEVICE FOR BAND SAWS.—G. A. ENSIGN, care of assignor to Defiance Mach. Wks., Defiance, Ohio. The object here is to provide a new and improved tension device for band-saws arranged to maintain a uniform tension on the saw blade to permit light or heavy sawing of hard or soft wood without danger of breaking the saw blade or running the same off the wheels.

DUST RECEPTACLE.—T. E. MITCHELL, Box 99, Meaderville, Butte, Mont. The principal object of this invention is to provide a receptacle adapted to be positioned adjacent a hole which is being drilled whereby the dust and other material being set free by the drill will be collected, thereby preventing it from circulating in the atmosphere.

MACHINE FOR REMOVING PULP FROM COFFEE BERRIES.—J. M. URGELLES, Baracoa, Cuba. The object of the invention is to provide a new and improved machine for removing the pulp from coffee berries in a very simple, effective and economical manner and without injury to the beans. Means provide for removing the pulp and embedding means from the berries and discharge the latter separately from the removed pulp and material.

METHOD FOR TREATING COFFEE BERRIES.—J. M. URGELLES, Baracoa, Cuba. This method consists essentially in embedding sand, sawdust or other abraiding material in the pulp of the berry, then subjecting the berry to a grinding, tumbling and brushing action to cause the abraiding material to loosen and detach the pulp from the berry, and finally separating the berry from the removed pulp and braiding material.

BOTTLE CLOSING DEVICE.—F. BAGAR, Vienna, Austria, care of B. Zechner, Inwald Glass Co., 25 West Broadway, N. Y., N. Y. This improvement relates to a device for securing closing caps on bottles and other vessels and an object of the invention is to provide a machine which will rapidly and firmly press the flange of the cap outward into engagement with an internal groove within the mouth of the bottle or other vessel.

Prime Movers and Their Accessories.

DEVICE FOR STARTING INTERNAL COMBUSTION ENGINES.—D. E. CROUSE, 3 North St., Annapolis, Md. This device will start an internal combustion engine through the medium of compressed air. A movable rack engages a pinion on the shaft of the engine, the movement of the rack into engagement with the pinion being accomplished by means of compressed air, and the return of the rack to its initial position being effected by means of a spring.

THRUST BEARING.—E. KREHER, care of Tampa Foundry & Machine Co., Tampa, Fla. This invention has reference more particularly to a thrust bearing which comprises a removable collar adapted to receive a shaft, and having at the end an annular recess, about the shaft, and bearing washers located in the recess and adapted to receive end thrust from an adjacent machine part.

STARTING DEVICE FOR INTERNAL COMBUSTION ENGINES.—R. H. MUNTZ, care of Geiszler Starting Device Co., 514 W. 57th St., New York, N. Y. In this case the invention refers to a device for starting an explosive or internal combustion engine without the necessity of cranking up; that is to say, the operator can start the engine, if it should happen to be attached to an automobile, while sitting in the operator's seat.

EXPLOSIVE ENGINE.—W. A. SCHAFFER, Schaffer & Orand, Box 299, Waco, Tex. This invention has in view a two-cycle explosive engine in which the cylinders are thoroughly cleared of the burnt gases after each explosion, preparatory to introducing the succeeding charge, whereby there is little opportunity for the engine to back-fire.

VALVE FOR ROTARY GAS ENGINES.—W. S. THOMPSON, care of Ga. Ry. & Electric Co., Smyrna, Ga. This invention relates to a valve construction for rotary gas engines designed to facilitate the storing of the combustible mixture under pressure in the firing chamber before ignition, and the release of the same therefrom after ignition, to apply the power of the burning gases to produce rotary motion of the moving parts.

ROTARY ENGINE.—H. LINDENBERG, 317 Smith St., West Hoboken, N. J. This invention has reference more particularly to an engine which comprises a stator, a rotor provided with a piston movable into an operative and an inoperative position, and means whereby said piston when in an operative position is partly balanced by live steam or other fluids under pressure.

Railways and Their Accessories.

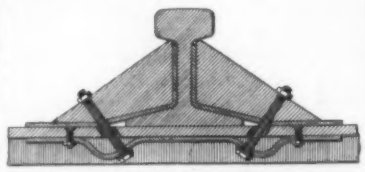
DECK SASH AND TRANSOM.—T. W. COTTLE, 382 Green St., Topeka, Kan. This invention provides a transom which may be used in railway cars and which may be opened or closed by a single movement and when closed will be positively locked in position. The sash may be opened to permit ventilation and may be held in open position by a simple and inexpensive means.

BRAKE RIGGING.—J. S. WATHEY, care of Butte Elec. Railway Co., Butte, Mont. This invention relates particularly to brake rigging, and the aim is to provide a car truck with a brake rigging, wherein the rods may pass over and below the motors, by virtue of a diagonally-disposed equalizing lever, to apply the brakes simultaneously to all the wheels.

RAILWAY TIE.—G. NAYLOR, 1271 So. 9th St., East St., Salt Lake City, Utah. An object here is to provide a form of rail-engaging device that will hold the rail firmly while permitting expansion and contraction, and by reason of which the use of fish plates may be done away with if desired. Rail-engaging means have securing bolts so related to the other elements entering into the tie that they will not be readily accessible to unauthorized persons seeking to tamper therewith.

AUTOMATIC TRAIN CONTROLLING SYSTEM.—F. D. SHINDEL, Huntingdon, Pa. Mr. Shindel's invention relates to automatic car controlling systems, and embodies more particularly an electrically operated system of this general type, so arranged as to automatically stop any car attempting to enter a block already occupied by another car.

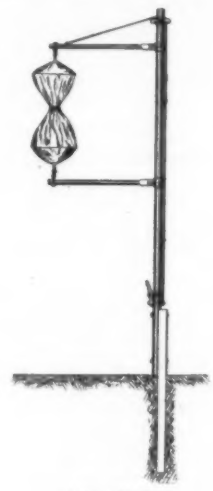
COMBINED RAIL FASTENER AND TIE.—E. YOUNG, Princeton, Ky. This inventor provides an improved structure formed of metal and arranged to thoroughly clamp and brace the rail in position. He also provides a tie and fastener formed with rail encircling members and braces and a tie structure for supporting the same, formed with a substan-



COMBINED RAIL FASTENER AND TIE.

tially U-shaped bar in cross section and a plate having raised members designed to accommodate securing bolts for holding the bracing members correctly in position. An enlarged transverse sectional view through a rail and combined fastener and tie is shown in the engraving.

MAIL CRANE.—J. M. HOUGH, agent for C. & N. W. Ry., Woodbine, Iowa. This invention has reference to cranes adapted to be erected at the side of a railway track and having means for so holding the mail bag as to permit the bag to be automatically taken up by a passing train, when the lower arm



MAIL CRANE.

will drop, and will strike the upper end of a trip lever, and thus a pin will be withdrawn from engagement with a pull rod, and allow the upper arm to fall. The engraving herewith presents an elevation showing the crane and its appurtances in the position of holding a mail bag.

Designs.

DESIGN FOR A LOCK JAR.—FINLAY, DICKS & Co., Ltd., Magazine, cor. Common Sts., New Orleans, La. In this ornamental design for a lock jar the main height of the structure is reached in panel elevations that have protruding edges at top and base. The cap of the jar adds to the ornamental design, the whole presenting a simple yet highly attractive article.

DESIGN FOR AN AUTOMOBILE HOOD.—F. PORSCHE, care of Oesterreichische Daimler, Motoren Gesellschaft, Wiener-Neustadt, Austria-Hungary. In this ornamental design for an automobile hood the side elevation, the plan view and the front elevation show a construction having the simple and graceful lines that picture strength and elegance.

NOTE.—Copies of any of these patents will be furnished by the SCIENTIFIC AMERICAN for ten cents each. Please state the name of the patentee, title of the invention, and date of this paper.

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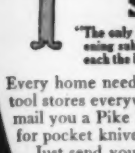

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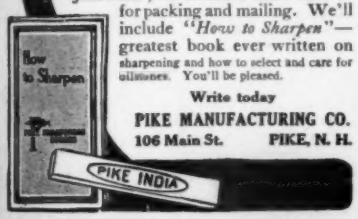

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Landsman's Log

(*Concluded from page 281*)

built and thirteen either under construction or authorized, making a proportion of only about one and one third destroyers per battleship as against the four which are necessary. In the maneuvers which I was privileged to witness, a fleet of eight battleships was accompanied by nineteen destroyers, or say, less than two and one half per ship. Had there been four per ship, the intervals between the destroyers would have been less and the chances of picking up the submarines would have been proportionately increased.

The Navy Department has very wisely adopted a policy of extreme secrecy as to the maneuvers of the torpedo-boat arm of the service; and, consequently, much that I witnessed during the successful escape of the fleet from Newport to the open sea cannot be written down in this log. Suffice it to say that the operations were completely successful and bore tribute to the effectiveness of this arm of the service.

During the afternoon, in returning to harbor, our group of five destroyers went through a series of evolutions which, as viewed from the bridge of the flagship and through unfamiliar eyes, displayed the facility and accuracy with which these craft are handled by their captains. We found anchorage for the night in one of the many sheltered harbors of the Rhode Island coast; and it is nothing to the discredit of the ship's company that they congratulated themselves on the fact that for this night at least, they would lie where the waters were so quiet as to give an opportunity for undisturbed sleep.

(*To be continued.*)

A Problem in Selling Electricity

THE invention and introduction of the new, durable tungsten filament lamp, which produces between two and three times as much light with the same current consumption as the ordinary carbon filament lamp, has placed the central station industry in a peculiar position and indeed in a crisis. Thanks to the new lamp the consumer has it in his power to secure from the electric light company a much greater amount of light than formerly possible without increasing his bill for current. It might be supposed that, because the new lamps have rendered it possible to obtain twice the amount of light formerly possible for the same amount of money, the number of consumers of current would increase, and that the central station would profit thereby. As a matter of fact, the increase in users of the new tungsten lamp means a proportionately greater loss to the central station. It costs just as much to read the meter of a consumer who burns tungsten lamps as it does to read the meter of a consumer who burns carbon lamps. The investment in coal, insulation, and the like required per customer is about the same regardless of the size of wire required for his connection, but depends somewhat on the density of service or the number of connections within a given area. The bookkeeping, expense of meter repairs, and maintenance cost, are no less in one case than in the other. Hence, when the consumer demands the installation of tungsten lamps, the cost to the central station is just as great and possibly greater than it ever was before, but the income based upon the running current charge is reduced. While it is true that the lessened demand on the part of the consumer releases so much more capacity for the supply of new customers, the cost of serving these new customers is out of proportion to the additional revenue produced. The high efficiency lamp saves the central station only coal and oil—it does not diminish the fixed charges. It does make it possible to take on new customers without any increase in the central station investment, and with little increase in distribution cost, but with considerable increase in other costs which fall entirely under the heading of customer's charges.

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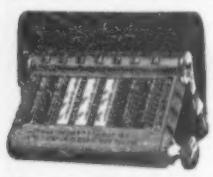

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Cleveland, O., June 7, 1912.

As a well wisher of Pearson's permit me to offer a suggestion. It may not appeal to you, but I'm looking at it from the buyer's side.

Usually, along about November, the magazines offer a reduced rate for subscription renewals in advance of the rush season. Last year Everybody offered two years for $2.00. . . .

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years, have been charging for electricity according to the quantity used. A customer who uses 100 units of electricity would, under their systems of charging, pay 5 times as much as the customer who uses 20 units. This seems on first thought to be a perfectly logical and fair method of selling electricity, and its appearance of fairness has made it the more difficult to show its actual inequity. A moment's consideration will make it plain that another factor must be considered in determining the cost of electric service, and this factor, when duly considered, may show that the *cost* of serving the two customers just mentioned may be relatively much greater or much less than the five to one ratio indicated by their relative consumption. This factor, so important but so little recognized in rate systems, involves the fixed service costs. Its relation to cost of service may best be illustrated by a concrete example.

Suppose that you decided to put a little electric generating plant in your basement to supply yourself and several of your neighbors with electricity, for which service you desire to charge them enough to cover your cost. You buy an electric generator, a gas engine to run it and a switchboard, and have them installed upon suitable foundations. You erect a short pole line (or else bury the wires underground in a conduit) in order to carry the electricity from your plant to your neighbors' houses. You buy one meter for each installation (your own included) and connect up to the house wiring. Before you have sold a single unit of electricity you have had to invest possibly a thousand dollars in equipment, conduit or poles, wire and meters.

Your plant is now burdened with certain fixed charges. First there is the interest on your money, then there is the amount which you must set aside each year to replace equipment as it is worn out. This depreciation allowance is very important, for if it is not recognized, after your plant has been in operation for a number of years you would find that your initial investment of $1,000 represented a lot of nearly worn-out machinery and equipment worth at the most a few hundred dollars. You must, therefore, earn more than the interest on your investment in order to come out even; otherwise it would have been better to have left your money in the bank, where at least the principal would not waste away. You next find that you have to take out insurance on the plant, and you also figure that the space it occupies on your premises is worth a little. Altogether, your calculations show that you must make about $10 a month in order to just cover the fixed investment charges outlined above.

As some of your neighbors wish to use electric irons during the day, you find you are expected to run the plant, we will say, from 6 A. M. till midnight. At the end of the first month you find your gas bill of the plant to be, we will say, $5. This represents running expense, which is distinct from the fixed expenses previously considered. Let us suppose that you find that the meters show that 125 units (kilowatt hours) have been consumed during the first month. You, therefore, divide the $15 total expense for the month ($10 fixed plus $5 running expense) showing a total cost of 12 cents a unit, and you make out the bills for the month at this rate. You discover a peculiar thing, however, in looking over the record of monthly consumption of electricity. Smith, who lives in a very small house with only 15 lamps, has used as much current as Brown who, living in a large one, has 50. You look into the cause of this and find that Smith has bought an electric iron, a small electric stove, an electric chafing dish and several other devices which he uses during the day, whereas Brown, in the big house, has used electricity for lighting only. Smith, when he receives his bill at 12 cents a unit, decides to discontinue the use of most of his devices because he cannot afford to pay so much for the electric conveniences. Therefore, next month

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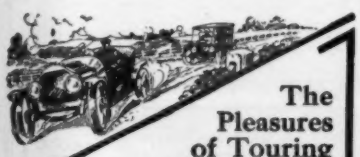

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you find your meters show that only 80 kilowatt hours have been used, due to Smith's decreased use of service. Eighty kilowatt hours at 12 cents brings in only $9.60; and even though your gas bill has dropped from $5 to $3.50 (because you have produced less current) you find that your total expense of $13.50 has exceeded your revenue by $3.90, and you realize that you are losing money.

About this time you hear that a new kind of incandescent electric lamp has been developed that uses only one third as much electricity as the old ones in giving the same amount of light. You begin to lie awake nights wondering what will happen to your plant. You realize that if your customers all started to use the new lamps, they could light their houses better than before on only half as much current. You have visions of the demand for electricity dropping off and your revenue going with it while your expense would be reduced by only a couple of dollars saving in gas, the fixed charge, of course, being not at all reduced. Your plant is relieved of part of its load by the reduced demands and, therefore, could carry several more customers, but in order to reach them you realize that you have to spend a considerable amount in order to extend your wires and buy more meters. This would add to the burden of fixed charges your plant must carry, and even if you succeeded in selling as many units as before, you would be getting only the same revenue as you did initially when your fixed expenses were less. Any way you figure you are bound to lose unless you raise the price per unit, and this you know to be next to impossible.

At last the thought strikes you that if you could only get Smith to use his many electric devices during the day, when your plant is running with but little load, you could afford to charge him much less than 12 cents per unit for the current used in excess of that required for his lighting. You go to him and say, "Smith, you are now using about 10 units a month at 12 cents to light your house. My plant is running with but little load all day, so that the expense to me of furnishing you with current during the day for these devices is only that of the extra gas required to carry your extra load. I am willing, therefore, to sell you electricity at 5 cents a unit for all you use in excess of that required to light your house." Smith figures a minute and says, "Well, I can afford to use my electric devices at a 5-cent rate, and I will be glad to make such an arrangement with you." At the end of the month he has used 55 units instead of 10, and you bill him for 10 units at the 12-cent rate and for the extra 45 at 5 cents, making a total bill of:

10 units, at 12 cents =	$1.20
45 units, at 5 cents =	2.25
55 units	$3.45

An average price of about 6.3 cents per unit.

Under the single rate of 12 cents per unit he would have had to pay $6.60 and so did not use the extra current which he is willing to buy at 5 cents. The plan works so well with Smith that you go to Brown and tell about your low rate for use of current in excess of that used for lighting alone. He, too, is willing to avail himself of the convenience of many electrical devices at the low rate. You begin to see that the number of units to be used at the high rate can very properly be determined by the customer's ordinary lighting requirements, and that this in turn is determined to a great extent by the size of his house, allowance being made in all cases for certain classes of rooms which are used but very little.

In this way you develop a rate having a 12-cent or primary charge for a certain number of units, according to the size of the man's house, and for all current used in excess of this amount you charge a secondary rate of 5 cents. This form of rate may be called a multiple rate (because of the primary and secondary charges) to distinguish it from the single rate of 12 cents per unit for all energy

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The Panama Canal

Issue of November 9, 1912

The time is drawing nigh when the Panama Canal will cease to be a vision and will become a reality. No engineering work in the entire history of the world is of greater magnitude. For decades statesmen and engineers have urged the digging of a waterway which would unite the Pacific with the Atlantic.

The Panama Canal is a monument to American engineering genius. To describe it adequately the SCIENTIFIC AMERICAN will devote to it the issue of November 9th—the November magazine number. How the great locks were constructed in which ocean-going steamers will swim, how a mountain was cut in two to make way for the Canal, how great steam shovels that scoop up five tons of dirt at a time dug out the bed of the waterway, and how landslides—avalanches, containing millions of cubic yards—were coped with, all this will be told. Our editor, Mr. J. Bernard Walker, made a special trip to Panama in order to gather much of the material which will appear in this number. He spent several weeks at the Isthmus, studied every square inch of the ground, spoke with the men who are doing the great work—Col. Goethals, Col. Gorgas, and the rest—and brought with him facts which have not yet found their way into print, and which will first appear in the SCIENTIFIC AMERICAN.

consumed. You find that by making the cost to the consumer bear some relation to the cost of rendering the service, you stimulate the use of current during the day when your plant would ordinarily be loaded but very little, and thus by encouraging the use of current for many hours each day you have put your plant on a self-supporting basis, and have satisfied the consumers by giving them a lower average rate for current because they use it for other than lighting purposes.

You no longer fear that you will be seriously embarrassed by the adoption of high efficiency lamps on the part of your customers; first, because the reduction in units would reduce the number charged at 5 cents, rather than the number charged at 12 cents; and second, because with a well developed heating and cooking load you are not so entirely dependent upon lighting for your revenue. You, therefore, feel in a position to urge your customers to use the high efficiency lamps. You know that they will reduce the customers' bills somewhat, but not enough to cause you to operate at a loss, and on the other hand your customers will greatly appreciate the increased light which these lamps will give at the same time that they reduce the bills. Electric light is thus made cheaper, and is able to compete with gas, not only as far as convenience and safety are concerned, but in cost as well, and the customer finds it possible to use many electrical devices which he would have otherwise found prohibitive from the cost standpoint.

The Heavens in October

(*Concluded from page 282.*)

obscured the Sun, though other parts of the sky were clear.

The Heavens.

We give again this month a detailed map of a portion of the sky which is now well observable in the evening. The principal configuration shown in it is the great square of Pegasus, near the middle. Apart from this, it is one of the poorer regions of the sky, being remote from the Milky Way, and rather sparsely sown with stars. Among double stars in this region visible in a small telescope we may note Epsilon Pegasi (not far from the western edge of the map, just south of the parallel of 10 degrees declination), which has a companion of the ninth magnitude, more than two minutes of arc away—too wide to be really called a double star, but a pretty object; Mu Cygni (about 20 degrees north of the last) a binary pair, now separated by about 2 seconds, and closing up; and Zeta Aquarii, another fine slow binary pair, separated by 3 seconds, which may be found almost on the celestial equator in 22 hours 22 minutes Right Ascension.

Of the constellations in other parts of the sky, Cetus and the Southern Fish are conspicuous, low in the south; Aquila, Cygnus and Lyra in the west; Ursa Minor and Draco in the north, with Ursa Major on the horizon, Perseus and Auriga in the northeast, and Aries and Taurus in the east, while Gemini and Orion are rising.

The Planets.

Mercury is theoretically a morning star until the 4th, and an evening star afterward; but he is too near the Sun to be observable.

Venus is evening star in Libra and Scorpio, setting about 6:30 P. M. in the middle of the month, and visible in the twilight.

Mars is approaching conjunction with the Sun, and though theoretically an evening star, cannot be observed.

Jupiter is evening star in Ophiachus, setting about 7:50 P. M. on the 15th.

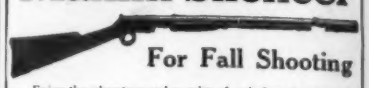
Saturn is in Taurus, approaching opposition, rises at 7:20 P. M. on the 15th, and is well observable in the latter part of the evening.

Uranus is in Capricornus. He is in quadrature with the Sun on the 23d, crossing the meridian at 6 P. M.

Neptune is in Gemini, and is also in quadrature, on the opposite side of the Sun, on the 19th.

The Moon is in her last quarter at 2

Maxim Silencer



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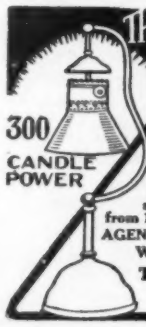

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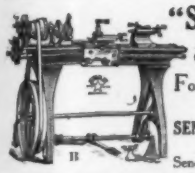

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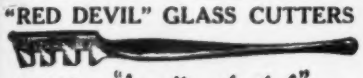

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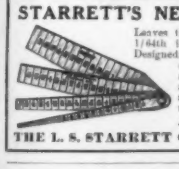

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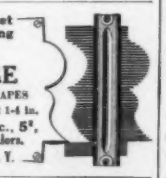

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Gale's Comet.

A comet, visible to the naked eye, was discovered by Gale of Sydney, Australia, on the morning of September 9th. On the 17th it was in 14 hours 27 minutes R. A. and 25 degrees 6 minutes south declination, and was moving northeastward at the rate of about 1¾ degrees per day. It is not yet observable in our northern latitude, but will probably be so in a few weeks, though until its orbit is computed no definite predictions can be made.

Princeton University Observatory.

Selling Agent Must Not Imitate His Principal's Goods or Trade-mark

JUDGE MAYER, of the United States District Court for the Southern District of New York, has recently issued an injunction in a suit brought by the Gund Manufacturing Company against the Strauss Manufacturing Company, the Ideal Novelty and Toy Company and George Borgfeldt & Co., restraining the defendants from making or selling merchandise which in appearance simulates the appearance of the merchandise of the Gund Manufacturing Company, or from using in connection with any similar merchandise the trade-mark of the complainant or any simulation thereof, and further from imitating the advertising matter of the complainant. This decision is important to manufacturers and manufacturers' agents, and in brief it is to the effect that one who has as a manufacturer's agent offered for sale and sold the goods of a manufacturer for and on account of the manufacturer, must not after the account is taken from him offer for sale similar goods bearing trade-marks like those of the manufacturer or use in connection with such goods advertising matter such as he formerly used in selling such goods.

The facts of the case are these: The Strauss Manufacturing Company was under contract with the Gund Manufacturing Company, to sell a certain toy in the shape of a duck which, when drawn over the ground, opened and closed its bill and gave forth a sound such as "quack-quack." The trade-mark applied to such ducks was "Duckie Doodles," and in presenting them to the trade, certain fancy circulars were used containing catch phrases such as "A Live One," "The Duck That Quacks," and others. After the contract was taken from the Strauss Manufacturing Company, the Gund Manufacturing Company learned that it had made arrangements with the Ideal Novelty and Toy Company to make up some ducks like those of the Gund Manufacturing Company, had applied to such ducks the trade-mark "Duckie Waddles," and had copied the advertising circulars containing the catch phrases above noted and had delivered to George Borgfeldt & Co. a sample of the imitation ducks, which last company was offering them to its customers and soliciting orders.

The Gund Manufacturing Company, through its attorney, Mr. Charles A. Munn, filed a bill of complaint joining all of these parties as defendants, and asking for an injunction, which was granted by Judge Mayer after a full hearing. Judge Mayer remarked at the hearing that the defendants must not make or sell any duck imitating in appearance the duck of the Gund Manufacturing Company.

The decision of Judge Mayer is in all respects in accord with the decisions of the same Court in the automobile lamp and horn cases, and the coffee mill case, and indicates that all unfair practices in competition in trade will be restrained.

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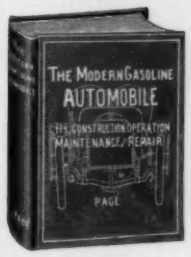

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